(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 September 2004 (23.09.2004)

PCT

(10) International Publication Number
WO 2004/081346 A2

(51) International Patent Classification[7]: E21F

(21) International Application Number:
PCT/US2004/007711

(22) International Filing Date: 11 March 2004 (11.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/453,678 11 March 2003 (11.03.2003) US

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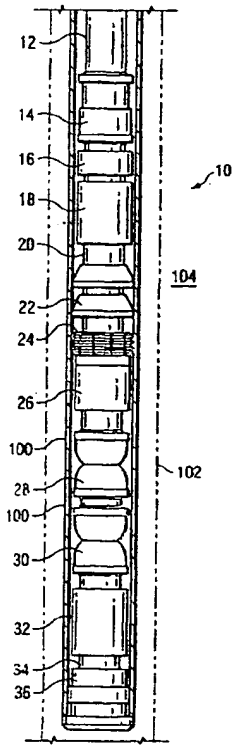
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,

[Continued on next page]

(54) Title: APPARATUS FOR RADIALLY EXPANDING AND PLASTICALLY DEFORMING A TUBULAR MEMBER

(57) Abstract: An apparatus for radially expanding and plastically deforming a tubular member.



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GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

APPARATUS FOR RADIALLY EXPANDING AND PLASTICALLY DEFORMING A TUBULAR MEMBER

Cross Reference To Related Applications

[0001] The present application claims the benefit of the filing date of U.S. provisional patent application serial no. 60/453,678, attorney docket no. 25791.253, filed on March 11, 2003, the disclosure of which is incorporated herein by reference.

[0002] The present application is a continuation-in-part of the following: (1) PCT patent application serial number PCT/US02/36157, attorney docket number 25791.87.02, filed on 11/12/2002, (2) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (3) PCT patent application serial number PCT/US03/04837, attorney docket number 25791.95.02, filed on 2/29/2003, (4) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, (5) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, (6) PCT patent application serial number PCT/US03/18530, attorney docket number 25791.108.02, filed on 6/11/2003, (7) PCT patent application serial number PCT/US03/29858, attorney docket number 25791.112.02, and (8) PCT patent application serial number PCT/US03/29460, attorney docket number 25791.114.02, filed on 9/23/2003, filed on 9/22/2003, the disclosures of which are incorporated herein by reference.

[0003] This application is related to the following co-pending applications: (1) U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (2) U.S. patent application serial no. 09/510,913, attorney docket no. 25791.7.02, filed on 2/23/2000, which claims priority from provisional application 60/121,702, filed on 2/25/99, (3) U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, which claims priority from provisional application 60/119,611, filed on 2/11/99, (4) U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (5) U.S. patent application serial no. 10/169,434, attorney docket no. 25791.10.04, filed on 7/1/02, which claims priority from provisional application 60/183,546, filed on 2/18/00, (6) U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (7) U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (8) U.S. patent number 6,575,240, which was filed as patent application serial no. 09/511,941, attorney docket no. 25791.16.02, filed on

2/24/2000, which claims priority from provisional application 60/121,907, filed on 2/26/99, (9) U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (10) U.S. patent application serial no. 09/981,916, attorney docket no. 25791.18, filed on 10/18/01 as a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (11) U.S. patent number 6,604,763, which was filed as application serial no. 09/559,122, attorney docket no. 25791.23.02, filed on 4/26/2000, which claims priority from provisional application 60/131,106, filed on 4/26/99, (12) U.S. patent application serial no. 10/030,593, attorney docket no. 25791.25.08, filed on 1/8/02, which claims priority from provisional application 60/146,203, filed on 7/29/99, (13) U.S. provisional patent application serial no. 60/143,039, attorney docket no. 25791.26, filed on 7/9/99, (14) U.S. patent application serial no. 10/111,982, attorney docket no. 25791.27.08, filed on 4/30/02, which claims priority from provisional patent application serial no. 60/162,671, attorney docket no. 25791.27, filed on 11/1/1999, (15) U.S. provisional patent application serial no. 60/154,047, attorney docket no. 25791.29, filed on 9/16/1999, (16) U.S. provisional patent application serial no. 60/438,828, attorney docket no. 25791.31, filed on 1/9/03, (17) U.S. patent number 6,564,875, which was filed as application serial no. 09/679,907, attorney docket no. 25791.34.02, on 10/5/00, which claims priority from provisional patent application serial no. 60/159,082, attorney docket no. 25791.34, filed on 10/12/1999, (18) U.S. patent application serial no. 10/089,419, filed on 3/27/02, attorney docket no. 25791.36.03, which claims priority from provisional patent application serial no. 60/159,039, attorney docket no. 25791.36, filed on 10/12/1999, (19) U.S. patent application serial no. 09/679,906, filed on 10/5/00, attorney docket no. 25791.37.02, which claims priority from provisional patent application serial no. 60/159,033, attorney docket no. 25791.37, filed on 10/12/1999, (20) U.S. patent application serial no. 10/303,992, filed on 11/22/02, attorney docket no. 25791.38.07, which claims priority from provisional patent application serial no. 60/212,359, attorney docket no. 25791.38, filed on 6/19/2000, (21) U.S. provisional patent application serial no. 60/165,228, attorney docket no. 25791.39, filed on 11/12/1999, (22) U.S. provisional patent application serial no. 60/455,051, attorney docket no. 25791.40, filed on 3/14/03, (23) PCT application US02/2477, filed on 6/26/02, attorney docket no. 25791.44.02, which claims priority from U.S. provisional patent application serial no. 60/303,711, attorney docket no. 25791.44, filed on 7/6/01, (24) U.S. patent application serial no. 10/311,412, filed on 12/12/02, attorney docket no. 25791.45.07, which claims priority from provisional patent application serial no. 60/221,443, attorney docket no. 25791.45, filed on 7/28/2000, (25) U.S. patent application serial no. 10/, filed on 12/18/02,

attorney docket no. 25791.46.07, which claims priority from provisional patent application serial no. 60/221,645, attorney docket no. 25791.46, filed on 7/28/2000, (26) U.S. patent application serial no. 10/322,947, filed on 1/22/03, attorney docket no. 25791.47.03, which claims priority from provisional patent application serial no. 60/233,638, attorney docket no. 25791.47, filed on 9/18/2000, (27) U.S. patent application serial no. 10/406,648, filed on 3/31/03, attorney docket no. 25791.48.06, which claims priority from provisional patent application serial no. 60/237,334, attorney docket no. 25791.48, filed on 10/2/2000, (28) PCT application US02/04353, filed on 2/14/02, attorney docket no. 25791.50.02, which claims priority from U.S. provisional patent application serial no. 60/270,007, attorney docket no. 25791.50, filed on 2/20/2001, (29) U.S. patent application serial no. 10/465,835, filed on 6/13/03, attorney docket no. 25791.51.06, which claims priority from provisional patent application serial no. 60/262,434, attorney docket no. 25791.51, filed on 1/17/2001, (30) U.S. patent application serial no. 10/465,831, filed on 6/13/03, attorney docket no. 25791.52.06, which claims priority from U.S. provisional patent application serial no. 60/259,486, attorney docket no. 25791.52, filed on 1/3/2001, (31) U.S. provisional patent application serial no. 60/452,303, filed on 3/5/03, attorney docket no. 25791.53, (32) U.S. patent number 6,470,966, which was filed as patent application serial number 09/850,093, filed on 5/7/01, attorney docket no. 25791.55, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (33) U.S. patent number 6,561,227, which was filed as patent application serial number 09/852,026 , filed on 5/9/01, attorney docket no. 25791.56, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (34) U.S. patent application serial number 09/852,027, filed on 5/9/01, attorney docket no. 25791.57, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (35) PCT Application US02/25608, attorney docket no. 25791.58.02, filed on 8/13/02, which claims priority from provisional application 60/318,021, filed on 9/7/01, attorney docket no. 25791.58, (36) PCT Application US02/24399, attorney docket no. 25791.59.02, filed on 8/1/02, which claims priority from U.S. provisional patent application serial no. 60/313,453, attorney docket no. 25791.59, filed on 8/20/2001, (37) PCT Application US02/29856, attorney docket no. 25791.60.02, filed on 9/19/02, which claims priority from U.S. provisional patent application serial no. 60/326,886, attorney docket no. 25791.60, filed on 10/3/2001, (38) PCT Application US02/20256, attorney docket no. 25791.61.02, filed on 6/26/02, which claims

priority from U.S. provisional patent application serial no. 60/303,740, attorney docket no. 25791.61, filed on 7/6/2001, (39) U.S. patent application serial no. 09/962,469, filed on 9/25/01, attorney docket no. 25791.62, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (40) U.S. patent application serial no. 09/962,470, filed on 9/25/01, attorney docket no. 25791.63, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (41) U.S. patent application serial no. 09/962,471, filed on 9/25/01, attorney docket no. 25791.64, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (42) U.S. patent application serial no. 09/962,467, filed on 9/25/01, attorney docket no. 25791.65, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (43) U.S. patent application serial no. 09/962,468, filed on 9/25/01, attorney docket no. 25791.66, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (44) PCT application US 02/25727, filed on 8/14/02, attorney docket no. 25791.67.03, which claims priority from U.S. provisional patent application serial no. 60/317,985, attorney docket no. 25791.67, filed on 9/6/2001, and U.S. provisional patent application serial no. 60/318,386, attorney docket no. 25791.67.02, filed on 9/10/2001, (45) PCT application US 02/39425, filed on 12/10/02, attorney docket no. 25791.68.02, which claims priority from U.S. provisional patent application serial no. 60/343,674 , attorney docket no. 25791.68, filed on 12/27/2001, (46) U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (47) U.S. utility patent application serial no. 10/516,467, attorney docket no. 25791.70, filed on 12/10/01, which is a continuation application of U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (48) PCT application US 03/00609, filed on 1/9/03, attorney docket no. 25791.71.02, which claims priority from U.S. provisional patent application serial no. 60/357,372 , attorney docket no. 25791.71, filed on 2/15/02, (49) U.S.

patent application serial no. 10/074,703, attorney docket no. 25791.74, filed on 2/12/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (50) U.S. patent application serial no. 10/074,244, attorney docket no. 25791.75, filed on 2/12/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (51) U.S. patent application serial no. 10/076,660, attorney docket no. 25791.76, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (52) U.S. patent application serial no. 10/076,661, attorney docket no. 25791.77, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (53) U.S. patent application serial no. 10/076,659, attorney docket no. 25791.78, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (54) U.S. patent application serial no. 10/078,928, attorney docket no. 25791.79, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (55) U.S. patent application serial no. 10/078,922, attorney docket no. 25791.80, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (56) U.S. patent application serial no. 10/078,921, attorney docket no. 25791.81, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (57) U.S. patent application serial no. 10/261,928, attorney docket no. 25791.82, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (58) U.S. patent application serial no. 10/079,276 , attorney docket no. 25791.83, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was

filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (59) U.S. patent application serial no. 10/262,009, attorney docket no. 25791.84, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (60) U.S. patent application serial no. 10/092,481, attorney docket no. 25791.85, filed on 3/7/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (61) U.S. patent application serial no. 10/261,926, attorney docket no. 25791.86, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (62) PCT application US 02/36157, filed on 11/12/02, attorney docket no. 25791.87.02, which claims priority from U.S. provisional patent application serial no. 60/338,996, attorney docket no. 25791.87, filed on 11/12/01, (63) PCT application US 02/36267, filed on 11/12/02, attorney docket no. 25791.88.02, which claims priority from U.S. provisional patent application serial no. 60/339,013, attorney docket no. 25791.88, filed on 11/12/01, (64) PCT application US 03/11765, filed on 4/16/03, attorney docket no. 25791.89.02, which claims priority from U.S. provisional patent application serial no. 60/383,917, attorney docket no. 25791.89, filed on 5/29/02, (65) PCT application US 03/15020, filed on 5/12/03, attorney docket no. 25791.90.02, which claims priority from U.S. provisional patent application serial no. 60/391,703, attorney docket no. 25791.90, filed on 6/26/02, (66) PCT application US 02/39418, filed on 12/10/02, attorney docket no. 25791.92.02, which claims priority from U.S. provisional patent application serial no. 60/346,309, attorney docket no. 25791.92, filed on 1/7/02, (67) PCT application US 03/06544, filed on 3/4/03, attorney docket no. 25791.93.02, which claims priority from U.S. provisional patent application serial no. 60/372,048, attorney docket no. 25791.93, filed on 4/12/02, (68) U.S. patent application serial no. 10/331,718, attorney docket no. 25791.94, filed on 12/30/02, which is a divisional U.S. patent application serial no. 09/679,906, filed on 10/5/00, attorney docket no. 25791.37.02, which claims priority from provisional patent application serial no. 60/159,033, attorney docket no. 25791.37, filed on 10/12/1999, (69) PCT application US 03/04837, filed on 2/29/03, attorney docket no. 25791.95.02, which claims priority from U.S. provisional patent application serial no. 60/363,829, attorney docket no. 25791.95, filed on 3/13/02, (70) U.S. patent application serial no. 10/261,927, attorney docket no. 25791.97, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no.

25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (71) U.S. patent application serial no. 10/262,008, attorney docket no. 25791.98, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (72) U.S. patent application serial no. 10/261,925, attorney docket no. 25791.99, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (73) U.S. patent application serial no. 10/199,524, attorney docket no. 25791.100, filed on 7/19/02, which is a continuation of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (74) PCT application US 03/10144, filed on 3/28/03, attorney docket no. 25791.101.02, which claims priority from U.S. provisional patent application serial no. 60/372,632, attorney docket no. 25791.101, filed on 4/15/02, (75) U.S. provisional patent application serial no. 60/412,542, attorney docket no. 25791.102, filed on 9/20/02, (76) PCT application US 03/14153, filed on 5/6/03, attorney docket no. 25791.104.02, which claims priority from U.S. provisional patent application serial no. 60/380,147, attorney docket no. 25791.104, filed on 5/6/02, (77) PCT application US 03/19993, filed on 6/24/03, attorney docket no. 25791.106.02, which claims priority from U.S. provisional patent application serial no. 60/397,284, attorney docket no. 25791.106, filed on 7/19/02, (78) PCT application US 03/13787, filed on 5/5/03, attorney docket no. 25791.107.02, which claims priority from U.S. provisional patent application serial no. 60/387,486 , attorney docket no. 25791.107, filed on 6/10/02, (79) PCT application US 03/18530, filed on 6/11/03, attorney docket no. 25791.108.02, which claims priority from U.S. provisional patent application serial no. 60/387,961, attorney docket no. 25791.108, filed on 6/12/02, (80) PCT application US 03/20694, filed on 7/1/03, attorney docket no. 25791.110.02, which claims priority from U.S. provisional patent application serial no. 60/398,061, attorney docket no. 25791.110, filed on 7/24/02, (81) PCT application US 03/20870, filed on 7/2/03, attorney docket no. 25791.111.02, which claims priority from U.S. provisional patent application serial no. 60/399,240, attorney docket no. 25791.111, filed on 7/29/02, (82) U.S. provisional patent application serial no. 60/412,487, attorney docket no. 25791.112, filed on 9/20/02, (83) U.S. provisional patent application serial no. 60/412,488, attorney docket no. 25791.114, filed on 9/20/02, (84) U.S. patent application serial no. 10/280,356, attorney docket no. 25791.115, filed on 10/25/02, which is a continuation of U.S. patent number 6,470,966, which was filed as patent application serial number 09/850,093, filed on 5/7/01, attorney docket no. 25791.55, as a divisional application of U.S.

Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (85) U.S. provisional patent application serial no. 60/412,177, attorney docket no. 25791.117, filed on 9/20/02, (86) U.S. provisional patent application serial no. 60/412,653, attorney docket no. 25791.118, filed on 9/20/02, (87) U.S. provisional patent application serial no. 60/405,610, attorney docket no. 25791.119, filed on 8/23/02, (88) U.S. provisional patent application serial no. 60/405,394, attorney docket no. 25791.120, filed on 8/23/02, (89) U.S. provisional patent application serial no. 60/412,544, attorney docket no. 25791.121, filed on 9/20/02, (90) PCT application US 03/24779, filed on 8/8/03, attorney docket no. 25791.125.02, which claims priority from U.S. provisional patent application serial no. 60/407,442, attorney docket no. 25791.125, filed on 8/30/02, (91) U.S. provisional patent application serial no. 60/423,363, attorney docket no. 25791.126, filed on 12/10/02, (92) U.S. provisional patent application serial no. 60/412,196, attorney docket no. 25791.127, filed on 9/20/02, (93) U.S. provisional patent application serial no. 60/412,187, attorney docket no. 25791.128, filed on 9/20/02, (94) U.S. provisional patent application serial no. 60/412,371, attorney docket no. 25791.129, filed on 9/20/02, (95) U.S. patent application serial no. 10/382,325, attorney docket no. 25791.145, filed on 3/5/03, which is a continuation of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (96) U.S. patent application serial no. 10/624,842, attorney docket no. 25791.151, filed on 7/22/03, which is a divisional of U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, which claims priority from provisional application 60/119,611, filed on 2/11/99, (97) U.S. provisional patent application serial no. 60/431,184, attorney docket no. 25791.157, filed on 12/5/02, (98) U.S. provisional patent application serial no. 60/448,526, attorney docket no. 25791.185, filed on 2/18/03, (99) U.S. provisional patent application serial no. 60/461,539, attorney docket no. 25791.186, filed on 4/9/03, (100) U.S. provisional patent application serial no. 60/462,750, attorney docket no. 25791.193, filed on 4/14/03, (101) U.S. provisional patent application serial no. 60/436,106, attorney docket no. 25791.200, filed on 12/23/02, (102) U.S. provisional patent application serial no. 60/442,942, attorney docket no. 25791.213, filed on 1/27/03, (103) U.S. provisional patent application serial no. 60/442,938, attorney docket no. 25791.225, filed on 1/27/03, (104) U.S. provisional patent application serial no. 60/418,687, attorney docket no. 25791.228, filed on 4/18/03, (105) U.S. provisional patent application serial no. 60/454,896, attorney docket no. 25791.236, filed on 3/14/03, (106) U.S. provisional patent application serial no. 60/450,504, attorney docket no. 25791.238, filed on 2/26/03, (107) U.S. provisional patent application serial no. 60/451,152, attorney docket no. 25791.239, filed on 3/9/03, (108) U.S. provisional

patent application serial no. 60/455,124, attorney docket no. 25791.241, filed on 3/17/03, (109) U.S. provisional patent application serial no. 60/453,678, attorney docket no. 25791.253, filed on 3/11/03, (110) U.S. patent application serial no. 10/421,682, attorney docket no. 25791.256, filed on 4/23/03, which is a continuation of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (111) U.S. provisional patent application serial no. 60/457,965, attorney docket no. 25791.260, filed on 3/27/03, (112) U.S. provisional patent application serial no. 60/455,718, attorney docket no. 25791.262, filed on 3/18/03, (113) U.S. patent number 6,550,821, which was filed as patent application serial no. 09/811,734, filed on 3/19/01, (114) U.S. patent application serial no. 10/436,467, attorney docket no. 25791.268, filed on 5/12/03, which is a continuation of U.S. patent number 6,604,763, which was filed as application serial no. 09/559,122, attorney docket no. 25791.23.02, filed on 4/26/2000, which claims priority from provisional application 60/131,106, filed on 4/26/99, (115) U.S. provisional patent application serial no. 60/459,776, attorney docket no. 25791.270, filed on 4/2/03, (116) U.S. provisional patent application serial no. 60/461,094, attorney docket no. 25791.272, filed on 4/8/03, (117) U.S. provisional patent application serial no. 60/461,038, attorney docket no. 25791.273, filed on 4/7/03, (118) U.S. provisional patent application serial no. 60/463,586, attorney docket no. 25791.277, filed on 4/17/03, (119) U.S. provisional patent application serial no. 60/472,240, attorney docket no. 25791.286, filed on 5/20/03, (120) U.S. patent application serial no. 10/619,285, attorney docket no. 25791.292, filed on 7/14/03, which is a continuation-in-part of U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (121) U.S. utility patent application serial no. 10/418,688, attorney docket no. 25791.257, which was filed on 4/18/03, as a division of U.S. utility patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, and (122) PCT patent application serial no. _____, attorney docket no. 25791.238.02, filed on 2/26/2004, the disclosures of which are incorporated herein by reference.

Background of the Invention

[0004] This invention relates generally to oil and gas exploration, and in particular to forming and repairing wellbore casings to facilitate oil and gas exploration.

Summary Of The Invention

[0005] According to one aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes

a support member, a cutting device for cutting the tubular member coupled to the support member, and an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member.

[0006] According to another aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes a support member, an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member, and an actuator coupled to the support member for displacing the expansion device relative to the support member.

[0007] According to another aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes a support member; an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a sealing assembly for sealing an annulus defined between the support member and the tubular member.

[0008] According to another aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes a support member; a first expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a second expansion device for radially expanding and plastically deforming the tubular member coupled to the support member.

[0009] According to another aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes a support member; an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a packer coupled to the support member.

[0010] According to another aspect of the present invention, an apparatus for radially expanding and plastically deforming an expandable tubular member is provided that includes a support member; a cutting device for cutting the tubular member coupled to the support member; a gripping device for gripping the tubular member coupled to the support member; a sealing device for sealing an interface with the tubular member coupled to the support member; a locking device for locking the position of the tubular member relative to the support member; a first adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; a second adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; a packer coupled to the support member; and an actuator for displacing one or more of the sealing assembly, first and second adjustable expansion devices, and packer relative to the support member.

[0011] According to another aspect of the present invention, an apparatus for cutting a tubular member is provided that includes a support member; and a plurality of movable cutting elements coupled to the support member.

[0012] According to another aspect of the present invention, an apparatus for engaging a tubular member is provided that includes a support member; and a plurality of movable elements coupled to the support member.

[0013] According to another aspect of the present invention, an apparatus for gripping a tubular member is provided that includes a plurality of movable gripping elements.

[0014] According to another aspect of the present invention, an actuator is provided that includes a tubular housing; a tubular piston rod movably coupled to and at least partially positioned within the housing; a plurality of annular piston chambers defined by the tubular housing and the tubular piston rod; and a plurality of tubular pistons coupled to the tubular piston rod, each tubular piston movably positioned within a corresponding annular piston chamber.

[0015] According to another aspect of the present invention, an apparatus for controlling a packer is provided that includes a tubular support member; one or more drag blocks releasably coupled to the tubular support member; and a tubular stinger coupled to the tubular support member for engaging the packer.

[0016] According to another aspect of the present invention, a packer is provided that includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member.

[0017] According to another aspect of the present invention, a method of radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing is provided that includes positioning the tubular member within the borehole in overlapping relation to the wellbore casing; radially expanding and plastically deforming a portion of the tubular member to form a bell section; and radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing; wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section.

[0018] According to another aspect of the present invention, a method for forming a mono diameter wellbore casing is provided that includes positioning an adjustable expansion device within a first expandable tubular member; supporting the first expandable tubular member and the adjustable expansion device within a borehole; lowering the adjustable expansion device out of the first expandable tubular member; increasing the outside

dimension of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; positioning the adjustable expansion device within a second expandable tubular member; supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member; lowering the adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the adjustable expansion device; and displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

[0019] According to another aspect of the present invention, a method for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes positioning an adjustable expansion device within the expandable tubular member; supporting the expandable tubular member and the adjustable expansion device within the borehole; lowering the adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the adjustable expansion device; displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and pressurizing an interior region of the expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

[0020] According to another aspect of the present invention, a method for forming a mono diameter wellbore casing is provided that includes positioning an adjustable expansion device within a first expandable tubular member; supporting the first expandable tubular member and the adjustable expansion device within a borehole; lowering the adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole; positioning the adjustable expansion mandrel within a second expandable tubular member; supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member; lowering the adjustable expansion mandrel out of the second expandable tubular member; increasing the outside dimension of the adjustable expansion

mandrel; displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

[0021] According to another aspect of the present invention, a method for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes positioning first and second adjustable expansion devices within the expandable tubular member; supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; lowering the first adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0022] According to another aspect of the present invention, a method for forming a mono diameter wellbore casing is provided that includes positioning first and second adjustable expansion devices within a first expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; lowering the first adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above

the lower portion of the expandable tubular member; positioning first and second adjustable expansion devices within a second expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; lowering the first adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0023] According to another aspect of the present invention, a method for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes positioning first and second adjustable expansion devices within the expandable tubular member; supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; lowering the first adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the

expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0024] According to another aspect of the present invention, a method for forming a mono diameter wellbore casing is provided that includes positioning first and second adjustable expansion devices within a first expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; lowering the first adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device; positioning first and second adjustable expansion devices within a second expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; lowering the first adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the

outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0025] According to another aspect of the present invention, a method for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; increasing the size of the adjustable expansion device; and displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member.

[0026] According to another aspect of the present invention, a method for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing is provided that includes supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; increasing the size of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member; and displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member.

[0027] According to another aspect of the present invention, a method of radially expanding and plastically deforming a tubular member is provided that includes positioning the tubular member within a preexisting structure; radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and radially expanding and plastically deforming a portion of the tubular member above the bell section.

[0028] According to another aspect of the present invention, a method of radially expanding and plastically deforming a tubular member is provided that includes applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another.

[0029] According to another aspect of the present invention, a system for radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing is provided that includes means for positioning the tubular member within the borehole in overlapping relation to the wellbore casing; means for radially expanding and plastically deforming a portion of the tubular member to form a bell section; and means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing; wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section.

[0030] According to another aspect of the present invention, a system for forming a mono diameter wellbore casing is provided that includes means for positioning an adjustable expansion device within a first expandable tubular member; means for supporting the first expandable tubular member and the adjustable expansion device within a borehole; means for lowering the adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; means for positioning the adjustable expansion device within a second expandable tubular member; means for supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member; means for lowering the adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; and means for displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

[0031] According to another aspect of the present invention, a system for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes means for positioning an adjustable expansion device within the expandable tubular member; means for supporting the expandable tubular member and the adjustable expansion device within the borehole; means for lowering the adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and means for pressurizing an interior region of the expandable tubular member

above the adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

[0032] According to another aspect of the present invention, a system for forming a mono diameter wellbore casing is provided that includes means for positioning an adjustable expansion device within a first expandable tubular member; means for supporting the first expandable tubular member and the adjustable expansion device within a borehole; means for lowering the adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; means for pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole; means for positioning the adjustable expansion mandrel within a second expandable tubular member; means for supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member; means for lowering the adjustable expansion mandrel out of the second expandable tubular member; means for increasing the outside dimension of the adjustable expansion mandrel; means for displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and means for pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

[0033] According to another aspect of the present invention, a system for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes means for positioning first and second adjustable expansion devices within the expandable tubular member; means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; means for lowering the first adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the

second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0034] According to another aspect of the present invention, a system for forming a mono diameter wellbore casing is provided that includes means for positioning first and second adjustable expansion devices within a first expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; means for lowering the first adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; means for positioning first and second adjustable expansion devices within a second expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; means for lowering the first adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and means for displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; wherein the outside

dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0035] According to another aspect of the present invention, a system for radially expanding and plastically deforming an expandable tubular member within a borehole is provided that includes means for positioning first and second adjustable expansion devices within the expandable tubular member; means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; means for lowering the first adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; means for pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and means for pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0036] According to another aspect of the present invention, a system for forming a mono diameter wellbore casing is provided that includes means for positioning first and second adjustable expansion devices within a first expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; means for lowering the first adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; means for pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first

expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; means for pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device; means for positioning first and second adjustable expansion devices within a second expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; means for lowering the first adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; means for pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and means for pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0037] According to another aspect of the present invention, a system for radially expanding and plastically deforming an expandable tubular member within a borehole is

provided that includes means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; means for increasing the size of the adjustable expansion device; and means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member.

[0038] According to another aspect of the present invention, a system for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing is provided that includes means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; means for increasing the size of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member; and means for displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member.

[0039] According to another aspect of the present invention, a system for radially expanding and plastically deforming a tubular member is provided that includes means for positioning the tubular member within a preexisting structure; means for radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and means for radially expanding and plastically deforming a portion of the tubular member above the bell section.

[0040] According to another aspect of the present invention, a system of radially expanding and plastically deforming a tubular member is provided that includes a support member; and means for applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another coupled to the support member.

[0041] According to another aspect of the present invention, a method of cutting a tubular member is provided that includes positioning a plurality of cutting elements within the tubular member; and bringing the cutting elements into engagement with the tubular member.

[0042] According to another aspect of the present invention, a method of gripping a tubular member is provided that includes positioning a plurality of gripping elements within the tubular member; bringing the gripping elements into engagement with the tubular member. In an exemplary embodiment, bringing the gripping elements into engagement with the tubular member includes displacing the gripping elements in an axial direction; and displacing the gripping elements in a radial direction.

[0043] According to another aspect of the present invention, a method of operating an actuator is provided that includes pressurizing a plurality of pressure chamber.

[0044] According to another aspect of the present invention, a method of injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure is provided that includes positioning the tubular member into the preexisting structure; sealing off an end of the tubular member; operating a valve within the end of the tubular member; and injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

[0045] According to another aspect of the present invention, a system for cutting a tubular member is provided that includes means for positioning a plurality of cutting elements within the tubular member; and means for bringing the cutting elements into engagement with the tubular member.

[0046] According to another aspect of the present invention, a system for gripping a tubular member is provided that includes means for positioning a plurality of gripping elements within the tubular member; and means for bringing the gripping elements into engagement with the tubular member.

[0047] According to another aspect of the present invention, an actuator system is provided that includes a support member; and means for pressurizing a plurality of pressure chambers coupled to the support member. In an exemplary embodiment, the system further includes means for transmitting torsional loads.

[0048] According to another aspect of the present invention, a system for injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure is provided that includes means for positioning the tubular member into the preexisting structure; means for sealing off an end of the tubular member; means for operating a valve within the end of the tubular member; and means for injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

[0049] According to another aspect of the present invention, a method of engaging a tubular member is provided that includes positioning a plurality of elements within the tubular member; and bringing the elements into engagement with the tubular member.

[0050] According to another aspect of the present invention, a system for engaging a tubular member is provided that includes means for positioning a plurality of elements within the tubular member; and means for bringing the elements into engagement with the tubular member. In an exemplary embodiment, the elements include a first group of elements; and a second group of elements; wherein the first group of elements are interleaved with the second group of elements.

Brief Description of the Drawings

[0051] Fig. 1 is a fragmentary cross-sectional illustration of an embodiment of a system for radially expanding and plastically deforming wellbore casing, including a tubular support member, a casing cutter, a ball gripper for gripping a wellbore casing, a force multiplier tension actuator, a safety sub, a cup sub, a casing lock, an extension actuator, a bell section adjustable expansion cone assembly, a casing section adjustable expansion cone assembly, a packer setting tool, a packer, a stinger, and an expandable wellbore casing, during the placement of the system within a wellbore.

[0052] Fig. 2 is a fragmentary cross-sectional illustration of the system of Fig. 1 during the subsequent displacement of the bell section adjustable expansion cone assembly, the casing section adjustable expansion cone assembly, the packer setting tool, the packer, and the stinger downwardly out of the end of the expandable wellbore casing and the expansion of the size of the bell section adjustable expansion cone assembly and the casing section adjustable expansion cone assembly.

[0053] Fig. 3 is a fragmentary cross-sectional illustration of the system of Fig. 2 during the subsequent operation of the tension actuator to displace the bell section adjustable expansion cone assembly upwardly into the end of the expandable wellbore casing to form a bell section in the end of the expandable wellbore casing.

[0054] Fig. 4 is a fragmentary cross-sectional illustration of the system of Fig. 3 during the subsequent reduction of the bell section adjustable expansion cone assembly.

[0055] Fig. 5 is a fragmentary cross-sectional illustration of the system of Fig. 4 during the subsequent upward displacement of the expanded casing section adjustable expansion cone assembly to radially expand the expandable wellbore casing.

[0056] Fig. 6 is a fragmentary cross-sectional illustration of the system of Fig. 5 during the subsequent lowering of the tubular support member, casing cutter, ball gripper, a force multiplier tension actuator, safety sub, cup sub, casing lock, extension actuator, bell section adjustable expansion cone assembly, casing section adjustable expansion cone assembly, packer setting tool, packer, and stinger and subsequent setting of the packer within the expandable wellbore casing above the bell section.

[0057] Fig. 7 is a fragmentary cross-sectional illustration of the system of Fig. 6 during the subsequent injection of fluidic materials into the system to displace the expanded casing section adjustable expansion cone assembly upwardly through the expandable wellbore casing to radially expand and plastically deform the expandable wellbore casing.

[0058] Fig. 8 is a fragmentary cross-sectional illustration of the system of Fig. 7 during the subsequent injection of fluidic materials into the system to displace the expanded casing section adjustable expansion cone assembly upwardly through the expandable wellbore casing and a surrounding preexisting wellbore casing to radially expand and plastically

deform the overlapping expandable wellbore casing and the surrounding preexisting wellbore casing.

[0059] Fig. 9 is a fragmentary cross-sectional illustration of the system of Fig. 8 during the subsequent operation of the casing cutter to cut off an end of the expandable wellbore casing.

[0060] Fig. 10 is a fragmentary cross-sectional illustration of the system of Fig. 9 during the subsequent removal of the cut off end of the expandable wellbore casing.

[0061] Figs. 11-1 and 11-2, 11A1 to 11A2, 11B1 to 11B2, 11C, 11D, 11E, 11F, 11G, 11H, 11I, 11j, and 11K are fragmentary cross-sectional and perspective illustrations of an exemplary embodiment of a casing cutter assembly.

[0062] Fig. 11L are fragmentary cross-sectional illustrations of an exemplary embodiment of the operation of the casing cutter assembly of Figs. 11-1 and 11-2, 11A1 to 11A2, 11B1 to 11B2, 11C, 11D, 11E, 11F, 11G, 11H, 11I, 11J, and 11K.

[0063] Figs. 12A1 to 12A4 and 12C1 to 12C4 are fragmentary cross-sectional illustrations of an exemplary embodiment of a ball gripper assembly.

[0064] Fig. 12B is a top view of a portion of the ball gripper assembly of Figs. 12A1 to 12A4 and 12C1 to 12C4.

[0065] Figs. 13A1 to 13A8 and 13B1 to 13B7 are fragmentary cross-sectional illustrations of an exemplary embodiment of a tension actuator assembly.

[0066] Figs. 14A to 14C is a fragmentary cross-sectional illustration of an exemplary embodiment of a packer setting tool assembly.

[0067] Figs. 15-1 to 15-5 is a fragmentary cross-sectional illustration of an exemplary embodiment of a packer assembly.

[0068] Figs. 16A1 to 16A5, 16B1 to 16B5, 16C1 to 16C5, 16D1 to 16D5, 16E1 to 16E6, 16F1 to 16F6, 16G1 to 16G6, and 16H1 to 16H5, are fragmentary cross-sectional illustrations of an exemplary embodiment of the operation of the packer setting tool and the packer assembly of Figs. 14A to 14C and 15-1 to 15-5.

Detailed Description of the Illustrative Embodiments

[0069] Referring initially to Figs. 1-10, an exemplary embodiment of a system 10 for radially expanding and plastically deforming a wellbore casing includes a conventional tubular support 12 having an end that is coupled to an end of a casing cutter assembly 14. In an exemplary embodiment, the casing cutter assembly 14 may be, or may include elements, of one or more conventional commercially available casing cutters for cutting wellbore casing, or equivalents thereof.

[0070] An end of a ball gripper assembly 16 is coupled to another end of the casing cutter assembly 14. In an exemplary embodiment, the ball gripper assembly 14 may be, or

may include elements, of one or more conventional commercially available ball grippers, or other types of gripping devices, for gripping wellbore casing, or equivalents thereof.

[0071] An end of a tension actuator assembly 18 is coupled to another end of the ball gripper assembly 16. In an exemplary embodiment, the tension actuator assembly 18 may be, or may include elements, of one or more conventional commercially actuators, or equivalents thereof.

[0072] An end of a safety sub assembly 20 is coupled to another end of the tension actuator assembly 18. In an exemplary embodiment, the safety sub assembly 20 may be, or may include elements, of one or more conventional apparatus that provide quick connection and/or disconnection of tubular members, or equivalents thereof.

[0073] An end of a sealing cup assembly 22 is coupled to another end of the safety sub assembly 20. In an exemplary embodiment, the sealing cup assembly 22 may be, or may include elements, of one or more conventional sealing cup assemblies, or other types of sealing assemblies, that sealingly engage the interior surfaces of surrounding tubular members, or equivalents thereof.

[0074] An end of a casing lock assembly 24 is coupled to another end of the sealing cup assembly 22. In an exemplary embodiment, the casing lock assembly 24 may be, or may include elements, of one or more conventional casing lock assemblies that lock the position of wellbore casing, or equivalents thereof.

[0075] An end of an extension actuator assembly 26 is coupled to another end of the casing lock assembly 24. In an exemplary embodiment, the extension actuator assembly 26 may be, or may include elements, of one or more conventional actuators, or equivalents thereof.

[0076] An end of an adjustable bell section expansion cone assembly 28 is coupled to another end of the extension actuator assembly 26. In an exemplary embodiment, the adjustable bell section expansion cone assembly 28 may be, or may include elements, of one or more conventional adjustable expansion devices for radially expanding and plastically deforming wellbore casing, or equivalents thereof.

[0077] An end of an adjustable casing expansion cone assembly 30 is coupled to another end of the adjustable bell section expansion cone assembly 28. In an exemplary embodiment, the adjustable casing expansion cone assembly 30 may be, or may include elements, of one or more conventional adjustable expansion devices for radially expanding and plastically deforming wellbore casing, or equivalents thereof.

[0078] An end of a packer setting tool assembly 32 is coupled to another end of the adjustable casing expansion cone assembly 30. In an exemplary embodiment, the packer setting tool assembly 32 may be, or may include elements, of one or more conventional

adjustable expansion devices for controlling the operation of a conventional packer, or equivalents thereof.

[0079] An end of a stinger assembly 34 is coupled to another end of the packer setting tool assembly 32. In an exemplary embodiment, the stinger assembly 34 may be, or may include elements, of one or more conventional devices for engaging a conventional packer, or equivalents thereof.

[0080] An end of a packer assembly 36 is coupled to another end of the stinger assembly 34. In an exemplary embodiment, the packer assembly 36 may be, or may include elements, of one or more conventional packers.

[0081] As illustrated in Fig. 1, in an exemplary embodiment, during operation of the system 10, an expandable wellbore casing 100 is coupled to and supported by the casing lock assembly 24 of the system. The system 10 is then positioned within a wellbore 102 that traverses a subterranean formation 104 and includes a preexisting wellbore casing 106.

[0082] As illustrated in Fig. 2, in an exemplary embodiment, the extension actuator assembly 26 is then operated to move the adjustable bell section expansion cone assembly 28, adjustable casing expansion cone assembly 30, packer setting tool assembly 32, stinger assembly 34, packer assembly 36 downwardly in a direction 108 and out of an end of the expandable wellbore casing 100. After the adjustable bell section expansion cone assembly 28 and adjustable casing expansion cone assembly 30 have been moved to a position out of the end of the expandable wellbore casing 100, the adjustable bell section expansion cone assembly and adjustable casing expansion cone assembly are then operated to increase the outside diameters of the expansion cone assemblies. In an exemplary embodiment, the increased outside diameter of the adjustable bell section expansion cone assembly 28 is greater than the increased outside diameter of the adjustable casing expansion cone assembly 30.

[0083] As illustrated in Fig. 3, in an exemplary embodiment, the ball gripper assembly 16 is then operated to engage and hold the position of the expandable tubular member 100 stationary relative to the tubular support member 12. The tension actuator assembly 18 is then operated to move the adjustable bell section expansion cone assembly 28, adjustable casing expansion cone assembly 30, packer setting tool assembly 32, stinger assembly 34, packer assembly 36 upwardly in a direction 110 into and through the end of the expandable wellbore casing 100. As a result, the end of the expandable wellbore casing 100 is radially expanded and plastically deformed by the adjustable bell section expansion cone assembly 28 to form a bell section 112. In an exemplary embodiment, during the operation of the system 10 described above with reference to Fig. 3, the casing lock assembly 24 may or may not be coupled to the expandable wellbore casing 100.

[0084] In an exemplary embodiment, the length of the end of the expandable wellbore casing 100 that is radially expanded and plastically deformed by the adjustable bell section expansion cone assembly 28 is limited by the stroke length of the tension actuator assembly 18. In an exemplary embodiment, once the tension actuator assembly 18 completes a stroke, the ball gripper assembly 16 is operated to release the expandable tubular member 100, and the tubular support 12 is moved upwardly to permit the tension actuator assembly to be re-set. In this manner, the length of the bell section 112 can be further extended by continuing to stroke and then re-set the position of the tension actuator assembly 18. Note, that, during the upward movement of the tubular support 12 to re-set the position of the tension actuator assembly 18, the expandable tubular wellbore casing 100 is supported by the expansion surfaces of the adjustable bell section expansion cone assembly 28.

[0085] As illustrated in Fig. 4, in an exemplary embodiment, the casing lock assembly 24 is then operated to engage and maintain the position of the expandable wellbore casing 100 stationary relative to the tubular support 12. The adjustable bell section expansion cone assembly 28, adjustable casing expansion cone assembly 30, packer setting tool assembly 32, stinger assembly 34, and packer assembly 36 are displaced downwardly into the bell section 112 in a direction 114 relative to the expandable wellbore casing 100 by operating the extension actuator 26 and/or by displacing the system 10 downwardly in the direction 114 relative to the expandable wellbore casing. After the adjustable bell section expansion cone assembly 28 and adjustable casing expansion cone assembly 30 have been moved downwardly in the direction 114 into the bell section 112 of the expandable wellbore casing 100, the adjustable bell section expansion cone assembly is then operated to decrease the outside diameter of the adjustable bell section expansion cone assembly. In an exemplary embodiment, the decreased outside diameter of the adjustable bell section expansion cone assembly 28 is less than the increased outside diameter of the adjustable casing expansion cone assembly 30. In an exemplary embodiment, during the operation of the system illustrated and described above with reference to Fig. 4, the ball gripper 16 may or may not be operated to engage the expandable wellbore casing 100.

[0086] As illustrated in Fig. 5, in an exemplary embodiment, the casing lock assembly 24 is then disengaged from the expandable wellbore casing 100 and fluidic material 116 is then injected into the system 10 through the tubular support 12 to thereby pressurize an annulus 118 defined within the expandable wellbore casing below the cup sub assembly 22. As a result, a pressure differential is created across the cup seal assembly 22 that causes the cup seal assembly to apply a tensile force in the direction 120 to the system 10. As a result, the system 10 is displaced upwardly in the direction 120 relative to the expandable wellbore casing 100 thereby pulling the adjustable casing expansion cone assembly 30 upwardly in

the direction 120 through the expandable wellbore casing thereby radially expanding and plastically deforming the expandable wellbore casing.

[0087] In an exemplary embodiment, the tension actuator assembly 16 may also be operated during the injection of the fluidic material 116 to displace the adjustable casing expansion cone assembly 30 upwardly relative to the tubular support 12. As a result, additional expansion forces may be applied to the expandable wellbore casing 100.

[0088] As illustrated in Fig. 6, in an exemplary embodiment, the radial expansion and plastic deformation of the expandable wellbore casing using the adjustable casing expansion cone assembly 30 continues until the packer assembly 36 is positioned within a portion of the expandable tubular member above the bell section 112. The packer assembly 36 may then be operated to engage the interior surface of the expandable wellbore casing 100 above the bell section 112.

[0089] In an exemplary embodiment, after the packer assembly 36 is operated to engage the interior surface of the expandable wellbore casing 100 above the bell section 112, a hardenable fluidic sealing material 122 may then be injected into the system 10 through the tubular support 12 and then out of the system through the packer assembly to thereby permit the annulus between the expandable wellbore casing and the wellbore 102 to be filled with the hardenable fluidic sealing material. The hardenable fluidic sealing material 122 may then be allowed to cure to form a fluid tight annulus between the expandable wellbore casing 100 and the wellbore 102, before, during, or after the completion of the radial expansion and plastic deformation of the expandable wellbore casing.

[0090] As illustrated in Fig. 7, in an exemplary embodiment, the fluidic material 116 is then re-injected into the system 10 through the tubular support 12 to thereby re-pressurize the annulus 118 defined within the expandable wellbore casing below the cup sub assembly 22. As a result, a pressure differential is once again created across the cup seal assembly 22 that causes the cup seal assembly to once again apply a tensile force in the direction 120 to the system 10. As a result, the system 10 is displaced upwardly in the direction 120 relative to the expandable wellbore casing 100 thereby pulling the adjustable casing expansion cone assembly 30 upwardly in the direction 120 through the expandable wellbore casing thereby radially expanding and plastically deforming the expandable wellbore casing and disengaging the stinger assembly 34 from the packer assembly 36. In an exemplary embodiment, during this operational mode, the packer assembly 36 prevents the flow of fluidic materials out of the expandable wellbore casing 100. As a result, the pressurization of the annulus 118 is rapid and efficient thereby enhancing the operational efficiency of the subsequent radial expansion and plastic deformation of the expandable wellbore casing 100.

[0091] In an exemplary embodiment, the tension actuator assembly 16 may also be operated during the re-injection of the fluidic material 116 to displace the adjustable casing

expansion cone assembly 30 upwardly relative to the tubular support 12. As a result, additional expansion forces may be applied to the expandable wellbore casing 100.

[0092] As illustrated in Fig. 8, in an exemplary embodiment, the radial expansion and plastic deformation of the expandable wellbore casing using the adjustable casing expansion cone assembly 30 continues until the adjustable casing expansion cone assembly 30 reaches the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106. At which point, the system 10 may radially expand the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106 and the surrounding portion of the preexisting wellbore casing. Consequently, in an exemplary embodiment, during the radial expansion of the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106, the tension actuator assembly 16 is also operated to displace the adjustable casing expansion cone assembly 30 upwardly relative to the tubular support 12. As a result, additional expansion forces may be applied to the expandable wellbore casing 100 and the preexisting wellbore casing 106 during the radial expansion of the portion 124 of the expandable wellbore casing that overlaps with the preexisting wellbore casing.

[0093] As illustrated in Fig. 9, in an exemplary embodiment, the entire length of the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106 is not radially expanded and plastically deformed. Rather, only part of the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106 is radially expanded and plastically deformed. The remaining part of the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106 is then cut away by operating the casing cutter assembly 14.

[0094] As illustrated in Fig. 10, the remaining part of the portion 124 of the expandable wellbore casing 100 that overlaps with the preexisting wellbore casing 106 that is cut away by operating the casing cutter assembly 14 is then also carried out of the wellbore 102 using the casing cutter assembly.

[0095] Furthermore, in an exemplary embodiment, the inside diameter of the expandable wellbore casing 100 above the bell section 112 is equal to the inside diameter of the portion of the preexisting wellbore casing 106 that does not overlap with the expandable wellbore casing 100. As a result, a wellbore casing is constructed that includes overlapping wellbore casings that together define an internal passage having a constant cross-sectional area.

[0096] In several exemplary embodiments, the system 10 includes one or more of the methods and apparatus disclosed in one or more of the following: (1) U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (2) U.S. patent application serial no. 09/510,913, attorney

docket no. 25791.7.02, filed on 2/23/2000, which claims priority from provisional application 60/121,702, filed on 2/25/99, (3) U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, which claims priority from provisional application 60/119,611, filed on 2/11/99, (4) U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (5) U.S. patent application serial no. 10/169,434, attorney docket no. 25791.10.04, filed on 7/1/02, which claims priority from provisional application 60/183,546, filed on 2/18/00, (6) U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (7) U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (8) U.S. patent number 6,575,240, which was filed as patent application serial no. 09/511,941, attorney docket no. 25791.16.02, filed on 2/24/2000, which claims priority from provisional application 60/121,907, filed on 2/26/99, (9) U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (10) U.S. patent application serial no. 09/981,916, attorney docket no. 25791.18, filed on 10/18/01 as a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (11) U.S. patent number 6,604,763, which was filed as application serial no. 09/559,122, attorney docket no. 25791.23.02, filed on 4/26/2000, which claims priority from provisional application 60/131,106, filed on 4/26/99, (12) U.S. patent application serial no. 10/030,593, attorney docket no. 25791.25.08, filed on 1/8/02, which claims priority from provisional application 60/146,203, filed on 7/29/99, (13) U.S. provisional patent application serial no. 60/143,039, attorney docket no. 25791.26, filed on 7/9/99, (14) U.S. patent application serial no. 10/111,982, attorney docket no. 25791.27.08, filed on 4/30/02, which claims priority from provisional patent application serial no. 60/162,671, attorney docket no. 25791.27, filed on 11/1/1999, (15) U.S. provisional patent application serial no. 60/154,047, attorney docket no. 25791.29, filed on 9/16/1999, (16) U.S. provisional patent application serial no. 60/438,828, attorney docket no. 25791.31, filed on 1/9/03, (17) U.S. patent number 6,564,875, which was filed as application serial no. 09/679,907, attorney docket no. 25791.34.02, on 10/5/00, which claims priority from provisional patent application serial no. 60/159,082, attorney docket no. 25791.34, filed on 10/12/1999, (18) U.S. patent application serial no. 10/089,419, filed on 3/27/02, attorney docket no. 25791.36.03, which claims priority from provisional patent application serial no.

60/159,039, attorney docket no. 25791.36, filed on 10/12/1999, (19) U.S. patent application serial no. 09/679,906, filed on 10/5/00, attorney docket no. 25791.37.02, which claims priority from provisional patent application serial no. 60/159,033, attorney docket no. 25791.37, filed on 10/12/1999, (20) U.S. patent application serial no. 10/303,992, filed on 11/22/02, attorney docket no. 25791.38.07, which claims priority from provisional patent application serial no. 60/212,359, attorney docket no. 25791.38, filed on 6/19/2000, (21) U.S. provisional patent application serial no. 60/165,228, attorney docket no. 25791.39, filed on 11/12/1999, (22) U.S. provisional patent application serial no. 60/455,051, attorney docket no. 25791.40, filed on 3/14/03, (23) PCT application US02/2477, filed on 6/26/02, attorney docket no. 25791.44.02, which claims priority from U.S. provisional patent application serial no. 60/303,711, attorney docket no. 25791.44, filed on 7/6/01, (24) U.S. patent application serial no. 10/311,412, filed on 12/12/02, attorney docket no. 25791.45.07, which claims priority from provisional patent application serial no. 60/221,443, attorney docket no. 25791.45, filed on 7/28/2000, (25) U.S. patent application serial no. 10/, filed on 12/18/02, attorney docket no. 25791.46.07, which claims priority from provisional patent application serial no. 60/221,645, attorney docket no. 25791.46, filed on 7/28/2000, (26) U.S. patent application serial no. 10/322,947, filed on 1/22/03, attorney docket no. 25791.47.03, which claims priority from provisional patent application serial no. 60/233,638, attorney docket no. 25791.47, filed on 9/18/2000, (27) U.S. patent application serial no. 10/406,648, filed on 3/31/03, attorney docket no. 25791.48.06, which claims priority from provisional patent application serial no. 60/237,334, attorney docket no. 25791.48, filed on 10/2/2000, (28) PCT application US02/04353, filed on 2/14/02, attorney docket no. 25791.50.02, which claims priority from U.S. provisional patent application serial no. 60/270,007, attorney docket no. 25791.50, filed on 2/20/2001, (29) U.S. patent application serial no. 10/465,835, filed on 6/13/03, attorney docket no. 25791.51.06, which claims priority from provisional patent application serial no. 60/262,434, attorney docket no. 25791.51, filed on 1/17/2001, (30) U.S. patent application serial no. 10/465,831, filed on 6/13/03, attorney docket no. 25791.52.06, which claims priority from U.S. provisional patent application serial no. 60/259,486, attorney docket no. 25791.52, filed on 1/3/2001, (31) U.S. provisional patent application serial no. 60/452,303, filed on 3/5/03, attorney docket no. 25791.53, (32) U.S. patent number 6,470,966, which was filed as patent application serial number 09/850,093, filed on 5/7/01, attorney docket no. 25791.55, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (33) U.S. patent number 6,561,227, which was filed as patent application serial number 09/852,026 , filed on 5/9/01, attorney docket no. 25791.56, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent

Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (34) U.S. patent application serial number 09/852,027, filed on 5/9/01, attorney docket no. 25791.57, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (35) PCT Application US02/25608, attorney docket no. 25791.58.02, filed on 8/13/02, which claims priority from provisional application 60/318,021, filed on 9/7/01, attorney docket no. 25791.58, (36) PCT Application US02/24399, attorney docket no. 25791.59.02, filed on 8/1/02, which claims priority from U.S. provisional patent application serial no. 60/313,453, attorney docket no. 25791.59, filed on 8/20/2001, (37) PCT Application US02/29856, attorney docket no. 25791.60.02, filed on 9/19/02, which claims priority from U.S. provisional patent application serial no. 60/326,886, attorney docket no. 25791.60, filed on 10/3/2001, (38) PCT Application US02/20256, attorney docket no. 25791.61.02, filed on 6/26/02, which claims priority from U.S. provisional patent application serial no. 60/303,740, attorney docket no. 25791.61, filed on 7/6/2001, (39) U.S. patent application serial no. 09/962,469, filed on 9/25/01, attorney docket no. 25791.62, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (40) U.S. patent application serial no. 09/962,470, filed on 9/25/01, attorney docket no. 25791.63, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (41) U.S. patent application serial no. 09/962,471, filed on 9/25/01, attorney docket no. 25791.64, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (42) U.S. patent application serial no. 09/962,467, filed on 9/25/01, attorney docket no. 25791.65, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (43) U.S. patent application serial no. 09/962,468, filed on 9/25/01, attorney docket no. 25791.66, which is a divisional of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (44) PCT application US 02/25727, filed on 8/14/02, attorney docket no. 25791.67.03, which claims priority from U.S. provisional patent application serial no. 60/317,985, attorney docket no. 25791.67, filed on 9/6/2001, and U.S. provisional patent application serial no. 60/318,386, attorney docket no. 25791.67.02, filed on 9/10/2001, (45) PCT application US 02/39425, filed on 12/10/02, attorney docket no. 25791.68.02, which claims priority from

U.S. provisional patent application serial no. 60/343,674 , attorney docket no. 25791.68, filed on 12/27/2001, (46) U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (47) U.S. utility patent application serial no. 10/516,467, attorney docket no. 25791.70, filed on 12/10/01, which is a continuation application of U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, (48) PCT application US 03/00609, filed on 1/9/03, attorney docket no. 25791.71.02, which claims priority from U.S. provisional patent application serial no. 60/357,372 , attorney docket no. 25791.71, filed on 2/15/02, (49) U.S. patent application serial no. 10/074,703, attorney docket no. 25791.74, filed on 2/12/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (50) U.S. patent application serial no. 10/074,244, attorney docket no. 25791.75, filed on 2/12/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (51) U.S. patent application serial no. 10/076,660, attorney docket no. 25791.76, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (52) U.S. patent application serial no. 10/076,661, attorney docket no. 25791.77, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (53) U.S. patent application serial no. 10/076,659, attorney docket no. 25791.78, filed on 2/15/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (54) U.S. patent application serial no. 10/078,928, attorney docket no. 25791.79, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application

60/121,841, filed on 2/26/99, (55) U.S. patent application serial no. 10/078,922, attorney docket no. 25791.80, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (56) U.S. patent application serial no. 10/078,921, attorney docket no. 25791.81, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (57) U.S. patent application serial no. 10/261,928, attorney docket no. 25791.82, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (58) U.S. patent application serial no. 10/079,276 , attorney docket no. 25791.83, filed on 2/20/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (59) U.S. patent application serial no. 10/262,009, attorney docket no. 25791.84, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (60) U.S. patent application serial no. 10/092,481, attorney docket no. 25791.85, filed on 3/7/02, which is a divisional of U.S. patent number 6,568,471, which was filed as patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, which claims priority from provisional application 60/121,841, filed on 2/26/99, (61) U.S. patent application serial no. 10/261,926, attorney docket no. 25791.86, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (62) PCT application US 02/36157, filed on 11/12/02, attorney docket no. 25791.87.02, which claims priority from U.S. provisional patent application serial no. 60/338,996, attorney docket no. 25791.87, filed on 11/12/01, (63) PCT application US 02/36267, filed on 11/12/02, attorney docket no. 25791.88.02, which claims priority from U.S. provisional patent application serial no. 60/339,013, attorney docket no. 25791.88, filed on 11/12/01, (64) PCT application US 03/11765, filed on 4/16/03, attorney docket no. 25791.89.02, which claims priority from U.S. provisional patent application serial no. 60/383,917, attorney docket no. 25791.89, filed on 5/29/02, (65) PCT application US 03/15020, filed on 5/12/03, attorney docket no. 25791.90.02, which claims priority from U.S. provisional patent application serial no. 60/391,703, attorney docket no. 25791.90, filed on

6/26/02, (66) PCT application US 02/39418, filed on 12/10/02, attorney docket no. 25791.92.02, which claims priority from U.S. provisional patent application serial no. 60/346,309, attorney docket no. 25791.92, filed on 1/7/02, (67) PCT application US 03/06544, filed on 3/4/03, attorney docket no. 25791.93.02, which claims priority from U.S. provisional patent application serial no. 60/372,048, attorney docket no. 25791.93, filed on 4/12/02, (68) U.S. patent application serial no. 10/331,718, attorney docket no. 25791.94, filed on 12/30/02, which is a divisional U.S. patent application serial no. 09/679,906, filed on 10/5/00, attorney docket no. 25791.37.02, which claims priority from provisional patent application serial no. 60/159,033, attorney docket no. 25791.37, filed on 10/12/1999, (69) PCT application US 03/04837, filed on 2/29/03, attorney docket no. 25791.95.02, which claims priority from U.S. provisional patent application serial no. 60/363,829, attorney docket no. 25791.95, filed on 3/13/02, (70) U.S. patent application serial no. 10/261,927, attorney docket no. 25791.97, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (71) U.S. patent application serial no. 10/262,008, attorney docket no. 25791.98, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (72) U.S. patent application serial no. 10/261,925, attorney docket no. 25791.99, filed on 10/1/02, which is a divisional of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (73) U.S. patent application serial no. 10/199,524, attorney docket no. 25791.100, filed on 7/19/02, which is a continuation of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (74) PCT application US 03/10144, filed on 3/28/03, attorney docket no. 25791.101.02, which claims priority from U.S. provisional patent application serial no. 60/372,632, attorney docket no. 25791.101, filed on 4/15/02, (75) U.S. provisional patent application serial no. 60/412,542, attorney docket no. 25791.102, filed on 9/20/02, (76) PCT application US 03/14153, filed on 5/6/03, attorney docket no. 25791.104.02, which claims priority from U.S. provisional patent application serial no. 60/380,147, attorney docket no. 25791.104, filed on 5/6/02, (77) PCT application US 03/19993, filed on 6/24/03, attorney docket no. 25791.106.02, which claims priority from U.S. provisional patent application serial no. 60/397,284, attorney docket no. 25791.106, filed on 7/19/02, (78) PCT application US 03/13787, filed on 5/5/03, attorney docket no. 25791.107.02, which claims priority from U.S. provisional patent application

serial no. 60/387,486 , attorney docket no. 25791.107, filed on 6/10/02, (79) PCT application US 03/18530, filed on 6/11/03, attorney docket no. 25791.108.02, which claims priority from U.S. provisional patent application serial no. 60/387,961, attorney docket no. 25791.108, filed on 6/12/02, (80) PCT application US 03/20694, filed on 7/1/03, attorney docket no. 25791.110.02, which claims priority from U.S. provisional patent application serial no. 60/398,061, attorney docket no. 25791.110, filed on 7/24/02, (81) PCT application US 03/20870, filed on 7/2/03, attorney docket no. 25791.111.02, which claims priority from U.S. provisional patent application serial no. 60/399,240, attorney docket no. 25791.111, filed on 7/29/02, (82) U.S. provisional patent application serial no. 60/412,487, attorney docket no. 25791.112, filed on 9/20/02, (83) U.S. provisional patent application serial no. 60/412,488, attorney docket no. 25791.114, filed on 9/20/02, (84) U.S. patent application serial no. 10/280,356, attorney docket no. 25791.115, filed on 10/25/02, which is a continuation of U.S. patent number 6,470,966, which was filed as patent application serial number 09/850,093, filed on 5/7/01, attorney docket no. 25791.55, as a divisional application of U.S. Patent Number 6,497,289, which was filed as U.S. Patent Application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, which claims priority from provisional application 60/111,293, filed on 12/7/98, (85) U.S. provisional patent application serial no. 60/412,177, attorney docket no. 25791.117, filed on 9/20/02, (86) U.S. provisional patent application serial no. 60/412,653, attorney docket no. 25791.118, filed on 9/20/02, (87) U.S. provisional patent application serial no. 60/405,610, attorney docket no. 25791.119, filed on 8/23/02, (88) U.S. provisional patent application serial no. 60/405,394, attorney docket no. 25791.120, filed on 8/23/02, (89) U.S. provisional patent application serial no. 60/412,544, attorney docket no. 25791.121, filed on 9/20/02, (90) PCT application US 03/24779, filed on 8/6/03, attorney docket no. 25791.125.02, which claims priority from U.S. provisional patent application serial no. 60/407,442, attorney docket no. 25791.125, filed on 8/30/02, (91) U.S. provisional patent application serial no. 60/423,363, attorney docket no. 25791.126, filed on 12/10/02, (92) U.S. provisional patent application serial no. 60/412,196, attorney docket no. 25791.127, filed on 9/20/02, (93) U.S. provisional patent application serial no. 60/412,187, attorney docket no. 25791.128, filed on 9/20/02, (94) U.S. provisional patent application serial no. 60/412,371, attorney docket no. 25791.129, filed on 9/20/02, (95) U.S. patent application serial no. 10/382,325, attorney docket no. 25791.145, filed on 3/5/03, which is a continuation of U.S. patent number 6,557,640, which was filed as patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, which claims priority from provisional application 60/137,998, filed on 6/7/99, (96) U.S. patent application serial no. 10/624,842, attorney docket no. 25791.151, filed on 7/22/03, which is a divisional of U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, which claims priority from provisional application 60/119,611, filed on 2/11/99,

(97) U.S. provisional patent application serial no. 60/431,184, attorney docket no. 25791.157, filed on 12/5/02, (98) U.S. provisional patent application serial no. 60/448,526, attorney docket no. 25791.185, filed on 2/18/03, (99) U.S. provisional patent application serial no. 60/461,539, attorney docket no. 25791.186, filed on 4/9/03, (100) U.S. provisional patent application serial no. 60/462,750, attorney docket no. 25791.193, filed on 4/14/03, (101) U.S. provisional patent application serial no. 60/436,106, attorney docket no. 25791.200, filed on 12/23/02, (102) U.S. provisional patent application serial no. 60/442,942, attorney docket no. 25791.213, filed on 1/27/03, (103) U.S. provisional patent application serial no. 60/442,938, attorney docket no. 25791.225, filed on 1/27/03, (104) U.S. provisional patent application serial no. 60/418,687, attorney docket no. 25791.228, filed on 4/18/03, (105) U.S. provisional patent application serial no. 60/454,896, attorney docket no. 25791.236, filed on 3/14/03, (106) U.S. provisional patent application serial no. 60/450,504, attorney docket no. 25791.238, filed on 2/26/03, (107) U.S. provisional patent application serial no. 60/451,152, attorney docket no. 25791.239, filed on 3/9/03, (108) U.S. provisional patent application serial no. 60/455,124, attorney docket no. 25791.241, filed on 3/17/03, (109) U.S. provisional patent application serial no. 60/453,678, attorney docket no. 25791.253, filed on 3/11/03, (110) U.S. patent application serial no. 10/421,682, attorney docket no. 25791.256, filed on 4/23/03, which is a continuation of U.S. patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, (111) U.S. provisional patent application serial no. 60/457,965, attorney docket no. 25791.260, filed on 3/27/03, (112) U.S. provisional patent application serial no. 60/455,718, attorney docket no. 25791.262, filed on 3/18/03, (113) U.S. patent number 6,550,821, which was filed as patent application serial no. 09/811,734, filed on 3/19/01, (114) U.S. patent application serial no. 10/436,467, attorney docket no. 25791.268, filed on 5/12/03, which is a continuation of U.S. patent number 6,604,763, which was filed as application serial no. 09/559,122, attorney docket no. 25791.23.02, filed on 4/26/2000, which claims priority from provisional application 60/131,106, filed on 4/26/99, (115) U.S. provisional patent application serial no. 60/459,776, attorney docket no. 25791.270, filed on 4/2/03, (116) U.S. provisional patent application serial no. 60/461,094, attorney docket no. 25791.272, filed on 4/8/03, (117) U.S. provisional patent application serial no. 60/461,038, attorney docket no. 25791.273, filed on 4/7/03, (118) U.S. provisional patent application serial no. 60/463,586, attorney docket no. 25791.277, filed on 4/17/03, (119) U.S. provisional patent application serial no. 60/472,240, attorney docket no. 25791.286, filed on 5/20/03, (120) U.S. patent application serial no. 10/619,285, attorney docket no. 25791.292, filed on 7/14/03, which is a continuation-in-part of U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, which is a continuation-in-part application of U.S. patent no. 6,328,113, which

was filed as U.S. Patent Application serial number 09/440,338, attorney docket number 25791.9.02, filed on 11/15/99, which claims priority from provisional application 60/108,558, filed on 11/16/98, and (121) U.S. utility patent application serial no. 10/418,688, attorney docket no. 25791.257, which was filed on 4/18/03, as a division of U.S. utility patent application serial no. 09/523,468, attorney docket no. 25791.11.02, filed on 3/10/2000, which claims priority from provisional application 60/124,042, filed on 3/11/99, the disclosures of which are incorporated herein by reference.

[0097] In an exemplary embodiment, the casing cutter assembly 14 is provided and operates substantially, at least in part, as disclosed in PCT patent application serial number PCT/US03/29858, attorney docket number 25791.112.02, filed on 9/22/2003, the disclosure of which is incorporated herein by reference.

[0098] In an exemplary embodiment, as illustrated in Figs. 11-1 and 11-2, 11A1 to 11A2, 11B1 to 11B2, 11C, 11D, 11E, 11F, 11G, 11H, 11I, 11J, and 11K, the casing cutter assembly 14 includes an upper tubular tool joint 11002 that defines a longitudinal passage 11002a and mounting holes, 11002b and 11002c, and includes an internal threaded connection 11002d, an inner annular recess 11002e, an inner annular recess 11002f, and an internal threaded connection 11002g. A tubular torque plate 11004 that defines a longitudinal passage 11004a and includes circumferentially spaced apart teeth 11004b is received within, mates with, and is coupled to the internal annular recess 11002e of the upper tubular tool joint 11002.

[0099] Circumferentially spaced apart teeth 11006a of an end of a tubular lower mandrel 11006 that defines a longitudinal passage 11006b, a radial passage 11006ba, and a radial passage 11006bb and includes an external threaded connection 11006c, an external flange 11006d, an external annular recess 11006e having a step 11006f at one end, an external annular recess 11006g, external teeth 11006h, an external threaded connection 11006i, and an external annular recess 11006j engage the circumferentially spaced apart teeth 11004b of the tubular torque plate 11004. An internal threaded connection 11008a of an end of a tubular toggle bushing 11008 that defines a longitudinal passage 11008b, an upper longitudinal slot 11008c , a lower longitudinal slot 11008d, mounting holes, 11008e, 11008f, 11008g, 11008h, 11008i, 11008j, 11008k, 11008l, 11008m, 11008n, 11008o, 11008p, 11008q, 11008r, 11008s, 11008t, 11008u, 11008v, 11008w, 11008x, 11008xa, and 11008xb, and includes an external annular recess 11008y, internal annular recess 11008z, external annular recess 11008aa, and an external annular recess 11008ab receives and is coupled to the external threaded connection 11006c of the tubular lower mandrel 11006.

[0100] A sealing element 11010 is received within the external annular recess 11008y of the tubular toggle bushing 11008 for sealing the interface between the tubular toggle bushing and the upper tubular tool joint 11002. A sealing element 11012 is received within

the internal annular recess 11008z of the tubular toggle bushing 11008 for sealing the interface between the tubular toggle bushing and the tubular lower mandrel 11006.

[0101] Mounting screws, 11014a and 11014b, mounted within and coupled to the mounting holes, 11008w and 11008x, respectively, of the tubular toggle bushing 11008 are also received within the mounting holes, 11002b and 11002c, of the upper tubular tool joint 11002. Mounting pins, 11016a, 11016b, 11016c, 11016d, and 11016e, are mounted within the mounting holes, 11008e, 11008f, 11008g, 11008h, and 11008i, respectively. Mounting pins, 11018a, 11018b, 11018c, 11018d, and 11018e, are mounted within the mounting holes, 11008t, 11008s, 11008r, 11008q, and 11008p, respectively. Mounting screws, 11020a and 11020b, are mounted within the mounting holes, 11008u and 11008v, respectively.

[0102] A first upper toggle link 11022 defines mounting holes, 11022a and 11022b, for receiving the mounting pins, 11016a and 11016b, and includes a mounting pin 11022c at one end. A first lower toggle link 11024 defines mounting holes, 11024a, 11024b, and 11024c, for receiving the mounting pins, 11022c, 11016c, and 11016d, respectively and includes an engagement arm 11024d. A first trigger 11026 defines a mounting hole 11026a for receiving the mounting pin 11016e and includes an engagement arm 11026b at one end, an engagement member 11026c, and an engagement arm 11026d at another end.

[0103] A second upper toggle link 11028 defines mounting holes, 11028a and 11028b, for receiving the mounting pins, 11018a and 11018b, and includes a mounting pin 11028c at one end. A second lower toggle link 11030 defines mounting holes, 11030a, 11030b, and 11030c, for receiving the mounting pins, 11028c, 11018c, and 11018d, respectively and includes an engagement arm 11030d. A second trigger 11032 defines a mounting hole 11032a for receiving the mounting pin 11018e and includes an engagement arm 11032b at one end, an engagement member 11032c, and an engagement arm 11032d at another end.

[0104] An end of a tubular spring housing 11034 that defines a longitudinal passage 11034a, mounting holes, 11034b and 11034c, and mounting holes, 11034ba and 11034ca, and includes an internal flange 11034d and an internal annular recess 11034e at one end, and an internal flange 11034f, an internal annular recess 11034g, an internal annular recess 11034h, and an external threaded connection 11034i at another end receives and mates with the end of the tubular toggle bushing 11008. Mounting screws, 11035a and 11035b, are mounted within and coupled to the mounting holes, 11008xb and 11008xa, respectively, of the tubular toggle bushing 11008 and are received within the mounting holes, 11034ba and 11034ca, respectively, of the tubular spring housing 11034.

[0105] A tubular retracting spring ring 11036 that defines mounting holes, 11036a and 11036b, receives and mates with a portion of the tubular lower mandrel 11006 and is received within and mates with a portion of the tubular spring housing 11034. Mounting

screws, 11038a and 11038b, are mounted within and coupled to the mounting holes, 11036a and 11036b, respectively, of the tubular retracting spring ring 11036 and extend into the mounting holes, 11034b and 11034c, respectively, of the tubular spring housing 11034.

[0106] Casing diameter sensor springs, 11040a and 11040b, are positioned within the longitudinal slots, 11008c and 1108d, respectively, of the tubular toggle bushing 11008 that engage the engagement members, 11026c and 11032c, and engagement arms,11026d and 11032d, of the first and second triggers, 11026 and 11032, respectively. An inner flange 11042a of an end of a tubular spring washer 11042 mates with and receives a portion of the tubular lower mandrel 11006 and an end face of the inner flange of the tubular spring washer is positioned proximate and end face of the external flange 11006d of the tubular lower mandrel. The tubular spring washer 11042 is further received within the longitudinal passage 11034a of the tubular spring housing 11034.

[0107] An end of a retracting spring 11044 that receives the tubular lower mandrel 11006 is positioned within the tubular spring washer 11042 in contact with the internal flange 11042a of the tubular spring washer and the other end of the retracting spring is positioned in contact with an end face of the tubular retracting spring ring 11036.

[0108] A sealing element 11046 is received within the external annular recess 11006j of the tubular lower mandrel 11006 for sealing the interface between the tubular lower mandrel and the tubular spring housing 11034. A sealing element 11048 is received within the internal annular recess 11034h of the tubular spring housing 11034 for sealing the interface between the tubular spring housing and the tubular lower mandrel 11006.

[0109] An internal threaded connection 11050a of an end of a tubular upper hinge sleeve 11050 that includes an internal flange 11050b and an internal pivot 11050c receives and is coupled to the external threaded connection 11034i of the end of the tubular spring housing 11034.

[0110] An external flange 11052a of a base member 11052b of an upper cam assembly 11052, that is mounted upon and receives the lower tubular mandrel 11006, that includes an internal flange 11052c that is received within the external annular recess 11006e of the lower tubular mandrel 11006 and a plurality of circumferentially spaced apart cam arms 11052d extending from the base member mates with and is received within the tubular upper hinge sleeve 11050. An end face of the base member 11052b of the upper cam assembly 11052 is coupled to an end face of the tubular spring housing 11034 and an end face of the external flange 11052a of the base member of the upper cam assembly 11052 is positioned in opposing relation to an end face of the internal flange 11050b of the tubular upper hinge sleeve 11050. Each of the cam arms 11052d of the upper cam assembly 11052 include external cam surfaces 11052e. In an exemplary embodiment, the base member 11052b of the upper cam assembly 11052 further includes axial teeth for interleaving with and

engaging axial teeth provided on the end face of the tubular spring housing 11034 for transmitting torsional loads between the tubular spring housing and the upper cam assembly.

[0111] A plurality of circumferentially spaced apart upper casing cutter segments 11054 are mounted upon and receive the lower tubular mandrel 11006 and each include an external pivot recess 11054a for mating with and receiving the internal pivot 11050c of the tubular upper hinge sleeve 11050 and an external flange 11054b and are pivotally mounted within the tubular upper hinge sleeve and are interleaved with the circumferentially spaced apart cam arms 11052d of the upper cam assembly 11052. A casing cutter element 11056 is coupled to and supported by the upper surface of each upper casing cutter segments 11054 proximate the external flange 11054b.

[0112] A plurality of circumferentially spaced apart lower casing cutter segments 11058 are mounted upon and receive the lower tubular mandrel 11006, are interleaved among the upper casing cutter segments 11054, are substantially identical to the upper casing cutter segments, and are oriented in the opposite direction to the upper casing cutter segments.

[0113] A lower cam assembly 11060 is mounted upon and receives the lower tubular mandrel 11006 that includes circumferentially spaced apart cam arms interleaved among the lower casing cutter segments 11058 is substantially identical to the upper cam assembly 11052 with the addition of mounting holes, 11060a, 11060b, 11060c, and 11060d. In an exemplary embodiment, the base member of the lower cam assembly 11060 further includes axial teeth for interleaving with and engaging axial teeth provided on the end face of the tubular sleeve 11066 for transmitting torsional loads between the tubular spring housing and the tubular sleeve.

[0114] Mounting screws, 11062a, 11062b, 11062c, and 11062e, are mounted within the mounting holes, 11060a, 11060b, 11060c, and 11060d, respectively, of the lower cam assembly 11060 and are received within the external annular recess 11006g of the lower cam assembly 11060.

[0115] A tubular lower hinge sleeve 11064 that receives the lower casing cutter segments 11058 and the lower cam assembly 11060 includes an internal flange 11064a for engaging the external flange of the base member of the lower cam assembly 11060, an internal pivot 11064b for pivotally mounting the lower casing cutter segments within the tubular lower hinge sleeve, and an internal threaded connection 11064c.

[0116] An external threaded connection 11066a of an end of a tubular sleeve 11066 that defines mounting holes, 11066b and 11066c, and includes an internal annular recess 11066d having a shoulder 11066e, an internal flange 11066f, and an internal threaded connection 11066g at another end is received within and coupled to the internal threaded connection 11064c of the tubular lower hinge sleeve 11064. An external threaded

connection 11068a of an end of a tubular member 11068 that defines a longitudinal passage 11068b and mounting holes, 11068c and 11068d, and includes an external annular recess 11068e, and an external threaded connection 11068f at another end is received within and is coupled to the internal threaded connection 11066g of the tubular sleeve 11066.

[0117] Mounting screws, 11070a and 11070b, are mounted in and coupled to the mounting holes, 11068c and 11068d, respectively, of the tubular member 11068 that also extend into the mounting holes, 11066b and 11066c, respectively, of the tubular sleeve 11066. A sealing element 11072 is received within the external annular recess 11068e of the tubular member 11068 for sealing the interface between the tubular member and the tubular sleeve 11066.

[0118] An internal threaded connection 11074a of a tubular retracting piston 11074 that defines a longitudinal passage 11074b and includes an internal annular recess 11074c and an external annular recess 11074d receives and is coupled to the external threaded connection 11006i of the tubular lower mandrel 11006. A sealing element 11076 is received within the external annular recess 11074d of the tubular retracting piston 11074 for sealing the interface between the tubular retracting piston and the tubular sleeve 11066. A sealing element 11078 is received within the internal annular recess 11074c of the tubular retracting piston 11074 for sealing the interface between the tubular retracting piston and the tubular lower mandrel 11006.

[0119] Locking dogs 11080 mate with and receive the external teeth 11006h of the tubular lower mandrel 11006. A spacer ring 11082 is positioned between an end face of the locking dogs 11080 and an end face of the lower cam assembly 11060. A release piston 11084 mounted upon the tubular lower mandrel 11006 defines a radial passage 11084a for mounting a burst disk 11086 includes sealing elements, 11084b, 11084c, and 11084d. The sealing elements, 11084b and 11084d, sealing the interface between the release piston 11084 and the tubular lower mandrel 11006. An end face of the release piston 11084 is positioned in opposing relation to an end face of the locking dogs 11080.

[0120] A release sleeve 11088 that receives and is mounted upon the locking dogs 11080 and the release piston 11084 includes an internal flange 11088a at one end that sealingly engages the tubular lower mandrel 11006. A bypass sleeve 11090 that receives and is mounted upon the release sleeve 11088 includes an internal flange 11090a at one end.

[0121] In an exemplary embodiment, during operation of the casing cutter assembly 14, the retracting spring 11044 is compressed and thereby applies a biasing spring force in a direction 11092 from the lower tubular mandrel 11006 to the tubular spring housing 11034 that, in the absence of other forces, moves and/or maintains the upper cam assembly 11052 and the upper casing cutter segments 11054 out of engagement with the lower casing cutter

segments 11058 and the lower cam assembly 11060. In an exemplary embodiment, during operation of the casing cutter assembly 14, an external threaded connection 12A1 to 12A4 of an end of the tubular support member 12 is coupled to the internal threaded connection 11002d of the upper tubular tool joint 11002 and an internal threaded connection 16a of an end of the ball gripper assembly 16 is coupled to the external threaded connection 11068f of the tubular member 11068.

[0122] The upper cam assembly 11052 and the upper casing cutter segments 11054 may be brought into engagement with the lower casing cutter segments 11058 and the lower cam assembly 11060 by pressurizing an annulus 11094 defined between the lower tubular mandrel 11006 and the tubular spring housing 11034. In particular, injection of fludic materials into the cam cutter assembly 14 through the longitudinal passage 11006b of the lower tubular mandrel 11006 and into the radial passage 11006ba may pressurize the annulus 11094 thereby creating sufficient operating pressure to generate a force in a direction 11096 sufficient to overcome the biasing force of the retracting spring 11044. As a result, the spring housing 11034 may be displaced in the direction 11096 relative to the lower tubular mandrel 11006 thereby displacing the tubular upper hinge sleeve 11050, upper cam assembly 11052 , and upper casing cutter segments 11054 in the direction 11096.

[0123] In an exemplary embodiment, as illustrated in Fig. 11L, the displacement of the upper cam assembly 11052 and upper casing cutter segments 11054 in the direction 11096 will cause the lower casing cutter segments 11058 to ride up the cam surfaces of the cam arms of the upper cam assembly 11052 while also pivoting about the lower tubular hinge segment 11064, and will also cause the upper casing cutter segments 11054 to ride up the cam surfaces of the cam arms of the lower cam assembly 11060 while also pivoting about the upper tubular hinge segment 11050.

[0124] In an exemplary embodiment, during the operation of the casing cutter assembly 14, when the upper and lower casing cutter segments, 11054 and 11058, brought into axial alignment in a radially expanded position, the casing cutter elements of the casing cutter segments are brought into intimate contact with the interior surface of a preeselected portion of the expandable wellbore casing 100. The casing cutter assembly 14 may then be rotated to thereby cause the casing cutter elements to cut through the expandable wellbore casing. The portion of the expandable wellbore casing 100 cut away from the remaining portion on the expandable wellbore casing may then be carried out of the wellbore 102 with the cut away portion of the expandable wellbore casing supported by the casing cutter elements.

[0125] In an exemplary embodiment, the upper cam assembly 11052 and the upper casing cutter segments 11054 may be moved out of engagement with the lower casing cutter segments 11058 and the lower cam assembly 11060 by reducing the operating pressure within the annulus 11094.

[0126] In an alternative embodiment, during operation of the casing cutter assembly 14, the upper cam assembly 11052 and the upper casing cutter segments 11054 may also be moved out of engagement with the lower casing cutter segments 11058 and the lower cam assembly 11060 by sensing the operating pressure within the longitudinal passage 11006b of the lower tubular mandrel 11006. In particular, if the operating pressure within the longitudinal passage 11006b of the lower tubular mandrel 11006 exceeds a predetermined value, the burst disc 11086 will open thereby pressurizing the interior of the tubular release sleeve 11088 thereby displacing the tubular release sleeve downwardly away from engagement with the locking dogs 11080. As a result, the locking dogs 11080 are released from engagement with the lower tubular mandrel 11006 thereby permitting the lower casing cutter segments 11058 and the lower cam assembly 11060 to be displaced downwardly relative to the lower tubular mandrel. The retracting piston 11074 may then be displaced downwardly by the operating pressure thereby impacting the internal flange 11066f of the lower tubular mandrel 11066. As a result, the lower tubular mandrel 11066, the lower casing cutter segments 11058, the lower cam assembly 11060, and tubular lower hinge sleeve 11064 are displaced downwardly relative to the tubular spring housing 11034 thereby moving the lower casing cutter segments 11058 and the lower cam assembly 11060 out of engagement with the upper cam assembly 11052 and the upper casing cutter segments 11054.

[0127] In an exemplary embodiment, during operation of the casing cutter assembly 14, the casing cutter assembly 14 senses the diameter of the expandable wellbore casing 100 using the upper toggle links, 11022 and 11028, lower toggle links, 11024 and 11030, and triggers, 11026 and 11032, and then prevents the engagement of the upper cam assembly 11052 and the upper casing cutter segments 11054 with the lower casing cutter segments 11058 and the lower cam assembly 11060. In particular, anytime the upper toggle links, 11022 and 11028, and lower toggle links, 11024 and 11030, are positioned within a portion of the expandable wellbore casing 100 that has not been radially expanded and plastically deformed by the system 10, the triggers, 11026 and 11032, will be maintained in a position in which the triggers will engage the internal flange 11034d of the end of the tubular spring housing 11034 thereby preventing the displacement of the tubular spring housing in the direction 11096. As a result, the upper cam assembly 11052 and the upper casing cutter segments 11054 cannot be brought into engagement with the lower casing cutter segments 11058 and the lower cam assembly 11060.

[0128] Conversely, anytime the upper toggle links, 11022 and 11028, and lower toggle links, 11024 and 11030, are positioned within a portion of the expandable wellbore casing 100 that has been radially expanded and plastically deformed by the system 10, the triggers, 11026 and 11032, will be pivoted by the engagement arms, 11024d and 11030d, of the

lower toggle links, 11024 and 11030, to a position in which the triggers will no longer engage the internal flange 11034d of the end of the tubular spring housing 11034 thereby permitting the displacement of the tubular spring housing in the direction 11096. As a result, the upper cam assembly 11052 and the upper casing cutter segments 11054 can be brought into engagement with the lower casing cutter segments 11058 and the lower cam assembly 11060.

[0129] In an alternative embodiment, the elements of the casing cutter assembly 14 that sense the diameter of the expandable wellbore casing 100 may be disabled or omitted.

[0130] In an exemplary embodiment, the ball gripper assembly 16 is provided and operates substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, and/or (2) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, the disclosures of which are incorporated herein by reference.

[0131] In an exemplary embodiment, as illustrated in Figs. 12A1 to 12A4, 12B and 12C1 to 12C4, the ball gripper assembly 16 includes an upper mandrel 1202 that defines a longitudinal passage 1202a and a radial passage 1202b and includes an internal threaded connection 1202c at one end, an external flange 1202d at an intermediate portion that includes an external annular recess 1202e having a shoulder 1202f and an external radial hole 1202g, an external annular recess 1202h, an external annular recess 1202i, an external annular recess 1202j having a tapered end 1202k including an external annular recess 1202ka, an external annular recess 1202l, and an external annular recess 1202m, and an external annular recess 1202n, an external radial hole 1202o, an external annular recess 1202p, and an external annular recess 1202q at another end.

[0132] An upper tubular bushing 1204 defines an internally threaded radial opening 1204a and includes an external flange 1204b having an external annular recess 1204c and an internal annular recess 1204d mates with and receives the external flange 1202d of the upper mandrel 1202. In particular, the internal annular recess 1204d of the upper tubular bushing 1204 mates with the shoulder 1202f of the external annular recess 1202e of the upper mandrel 1202. A screw 1206 that is threadably coupled to the internally threaded radial opening 1204a of the upper tubular bushing 1204 extends into the external radial hole 1202g of the external flange 1202d of the upper mandrel 1202.

[0133] A deactivation tubular sleeve 1208 defines a radial passage 1208a and includes an internal annular recess 1208b that mates with and receives an end of the external annular recess 1204c of the external flange 1204b of the upper tubular bushing 1204, an internal annular recess 1208c that mates with and receives the external flange 1202d of the upper mandrel 1202, an internal annular recess 1208d, an internal annular recess 1208e,

and an internal annular recess 1208f. A deactivation spring 1210 is received within an annulus 1212 defined between the internal annular recess 1208b of the deactivation tubular sleeve 1208, an end face of the external annular recess 1204c of the external flange 1204b of the upper tubular bushing 1204, and the external annular recess 1202h of the external flange 1202d of the upper mandrel 1202.

[0134] A sealing member 1214 is received with the external annular recess 1202i of the external flange 1202d of the upper mandrel 1202 for sealing the interface between the upper mandrel and the deactivation tubular sleeve 1208. An annular spacer element 1216 is received within the external annular recess 1202ka of the tapered end 1202k of the external annular recess 1202j of the upper mandrel 1202.

[0135] One or more inner engagement elements 1218a of a tubular coglet 1218 engage and are received within the external annular recess 1202ka of the tapered end 1202k of the external annular recess 1202j of the upper mandrel 1202 and one or more outer engagement elements 1218b of the coglet engage and are received within the internal annular recess 1208d of the deactivation tubular sleeve 1208.

[0136] An external annular recess 1220a of an end of a tubular coglet prop 1220 that includes an inner flange 1220b receives and mates with the inner surfaces of the outer engagement elements 1218b of the coglet 1218. The end of the tubular coglet prop 1220 further receives and mates with the external annular recess 1202j of the external flange 1202d of the upper mandrel 1202. A sealing element 1222 is received within the external annular recess 1202l of the upper mandrel 1202 for sealing the interface between the upper mandrel and the tubular coglet prop 1220.

[0137] An end of a tubular bumper sleeve 1224 that includes internal and external flanges, 1224a and 1224b, and a hole 1224c at another end mates with and receives the external annular recess 1202m of the external flange 1202d of the upper mandrel 1202. A coglet spring 1226 is received within an annulus 1228 defined between the external annular recess 1202m of the external flange 1202d of the upper mandrel 1202, the tubular coglet prop 1220, the inner flange 1220b of the tubular coglet prop, an end face of the tubular bumper sleeve 1224, and the internal annular recess 1208c of the deactivation tubular sleeve 1208.

[0138] A tubular ball race 1228 that defines a plurality of tapered annular recesses 1228a and an internally threaded radial opening 1228b and includes one or more axial engagement elements 1228c at one end and one or more axial engagement elements 1228d at another end receives and mates with the other end of the upper mandrel 1202. In an exemplary embodiment, the axial engagement elements 1228c of the tubular ball race 1228 are received within and are coupled to the hole 1224c of the tubular bumper sleeve 1224. An end of a tubular activation sleeve 1230 that defines a plurality of radial openings

1230a, a radial opening 1230b, a radial opening 1230c, and includes an internal annular recess 1230d receives and mates with the tubular ball race 1228. In an exemplary embodiment, an end face of an end of the tubular activation sleeve 1230 is positioned proximate and in opposing relation to an end face of an end of the deactivation sleeve 1208. In an exemplary embodiment, the radial openings 1230a are aligned with and positioned in opposing relation to corresponding of tapered annular recesses 1228a of the tubular ball race 1228, and the radial openings are also narrowed in cross section in the radial direction for reasons to be described.

[0139] Balls 1232 are received within each of the of tapered annular recesses 1228a and corresponding radial openings 1230a of the tubular ball race 1228 and tubular activation sleeve 1230, respectively. In an exemplary embodiment, the narrowed cross sections of the radial openings 1230a of the tubular activation sleeve 1230 will permit the balls 1232 to be displaced outwardly in the radial direction until at least a portion of the balls extends beyond the outer perimeter of the tubular activation sleeve to thereby permit engagement of the balls with an outer structure such as, for example, a wellbore casing.

[0140] A lower mandrel 1234 that defines a longitudinal passage 1234a and an internally threaded radial passage 1234b at one end and includes internal annular recesses, 1234c and 1234d, for receiving and mating with the external annular recesses, 1202p and 1202q, of the upper mandrel 1202, an internal annular recess 1234e, an external flange 1234f, and an externally threaded connection 1234g at another end. In an exemplary embodiment, as illustrated in Fig. 12B, the end of the lower mandrel 1234 further includes longitudinal recesses 1234h for receiving and mating with corresponding axial engagement elements 1228d of the tubular ball race 1228. A sealing element 1235 is received within the internal annular recess 1234d of the lower mandrel 1234 for sealing an interface between the lower mandrel and the external annular recess 1202p of the upper mandrel 1202.

[0141] A tubular spring retainer 1236 that defines a radial passage 1236a and includes an external annular recess 1236b at one end mates with and receives the end of the lower mandrel 1234 and is positioned proximate an end face of the external flange 1234f of the lower mandrel. A tubular spring retainer 1238 receives and mates with the end of the lower mandrel 1234 and is received and mates with the internal annular recess 1230d of the tubular activation sleeve 1230.

[0142] An activation spring 1240 is received within an annulus 1242 defined an end face of the tubular spring retainer 1238, an end face of the spring retainer 1236, the internal annular recess 1230d of the tubular activation sleeve 1230, and the end of the lower mandrel 1234. A retainer screw 1242 is received within and is threadably coupled to the internally threaded radial opening 1234b of the lower mandrel 1234 that also extends into the external radial hole 1202o of the upper mandrel 1202.

[0143] During operation of the ball gripper assembly 16, in an exemplary embodiment, as illustrated in Figs. 12A1 to 12A4, the ball gripper assembly may be positioned within the expandable wellbore casing 100 and the internally threaded connection 1202c of the upper mandrel 1202 may be coupled to an externally threaded connection 14a of an end of the casing cutter assembly 14 and the externally threaded connection 1234g of the lower mandrel 1234 may be coupled to an internally threaded connection 18a of an end of the tension actuator assembly 18.

[0144] In an alternative embodiment, the internally threaded connection 1202c of the upper mandrel 1202 may be coupled to an externally threaded connection of an end of the tension actuator assembly 18 and the externally threaded connection 1234g of the lower mandrel 1234 may be coupled to an internally threaded connection of an end of casing cutter assembly 14.

[0145] In an exemplary embodiment, the deactivation spring 1210 has a greater spring rate than the activation spring 1240. As a result, in an initial operating mode, as illustrated in Figs. 12A1 to 12A4, a biasing spring force is applied to the deactivation sleeve 1208 and activation sleeve 1230 in a direction 1244 that maintains the activation sleeve in a position relative to the tubular ball race 1228 that maintains the balls 1232 within the radially inward portions of the corresponding tapered annular recesses 1228a of the tubular ball race such that the balls do not extend beyond the perimeter of the activation sleeve to engage the expandable wellbore casing 100.

[0146] As illustrated in Figs. 12C1 to 12C4, in an exemplary embodiment, the ball gripper 16 may be operated to engage the interior surface of the expandable wellbore casing 100 by injecting a fluidic material 1250 into the ball gripper assembly through the longitudinal passages 1202a and 1234aa, of the upper and lower mandrels, 1202 and 1234, respectively.

[0147] In particular, when the longitudinal and radial passages, 1202a and 1202b, respectively, of the upper mandrel 1202 are pressurized by the injection of the fluidic material 1250, the internal annular recess 1208c of the deactivation tubular sleeve 1208 is pressurized. When the operating pressure of the fluidic material 1250 within the internal annular recess 1208c of the deactivation tubular sleeve 1208 is sufficient to overcome the biasing spring force of the deactivation spring 1210, the deactivation tubular sleeve is displaced in a direction 1252. As a result, the spring force provided by the activation spring 1240 then may displace the activation tubular sleeve 1230 in the direction 1252 thereby moving the balls 1232 on the corresponding tapered annular recesses 1228a of the tubular ball race 1228 outwardly in a radial direction into engagement with the interior surface of the expandable wellbore casing 100. In an exemplary embodiment, the operating pressure of

the fluidic material 1250 sufficient to overcome the biasing spring force of the deactivation spring 1210 was about 100 psi.

[0148] In an exemplary embodiment, when the operating pressure of the fluidic material 1250 is reduced, the operating pressure of the fluidic material 1250 within the internal annular recess 1208c of the deactivation tubular sleeve 1208 is no longer sufficient to overcome the biasing spring force of the deactivation spring 1210, and the deactivation tubular sleeve and the activation tubular sleeve 1230 are displaced in a direction opposite to the direction 1252 thereby moving the balls 1232 radially inwardly and out of engagement with the interior surface of the expandable wellbore casing 100.

[0149] In an exemplary embodiment, the ball gripper assembly 16 is operated to engage the interior surface of the expandable wellbore casing 100 in combination with the operation of the tension actuator assembly 18 to apply an upward tensile force to one or more elements of the system 10 coupled to and positioned below the tension actuator assembly. As a result, a reaction force comprising a downward tensile force is applied to the lower mandrel 1234 of the ball gripper assembly 16 in a direction opposite to the direction 1252 during the operation of the tension actuator assembly 18. Consequently, due to the geometry of the tapered 1228a of the tubular ball race 1228, the balls 1232 are driven up the tapered annular recesses 1228a of the tubular ball race 1228 with increased force and the contact force between the balls 1232 and the interior surface of the expandable wellbore casing 100 is significantly increased thereby correspondingly increasing the gripping force and effect of the ball gripper assembly.

[0150] In an exemplary embodiment, the ball gripper assembly 16 may be operated to radially expand and plastically deform discrete portions of the expandable wellbore casing 100 by controlling the amount of contact force applied to the interior surface of the expandable wellbore casing by the balls 1232 of the ball gripper assembly. In an experimental test of an exemplary embodiment of the ball gripper assembly 16, an expandable wellbore casing was radially expanded and plastically deformed. This was an unexpected result.

[0151] In an exemplary embodiment, the tension actuator assembly 18 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (2) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, (3) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, and/or (4) PCT patent application serial number PCT/US03/29460, attorney docket number 25791.114.02, filed on 9/23/2003, the disclosures of which are incorporated herein by reference.

[0152] In an exemplary embodiment, as illustrated in Figs. 13A1 to 13A8 and 13B1 to 13B7, the tension actuator assembly 18 includes an upper tubular support member 13002 that defines a longitudinal passage 13002a, and external internally threaded radial openings, 13002b and 13002c, and an external annular recess 13002d and includes an internally threaded connection 13002e at one end and an external flange 13002f, an external annular recess 13002g having an externally threaded connection, and an internal annular recess 13002h having an internally threaded connection at another end. An end of a tubular actuator barrel 13004 that defines radial passages, 13004a and 13004b, at one end and radial passages, 13004c and 13004d, includes an internally threaded connection 13004e at one end that mates with, receives, and is threadably coupled to the external annular recess 13002g of the upper tubular support member 13002 and abuts and end face of the external flange 13002f of the upper tubular support member and an internally threaded connection 13004f at another end.

[0153] Torsional locking pins, 13006a and 13006b, are coupled to and mounted within the external radial mounting holes, 13002b and 13002c, respectively, of the upper tubular support member and received within the radial passages, 13004a and 13004b, of the end of the tubular actuator barrel 13004. The other end of the tubular actuator barrel 13004 receives and is threadably coupled to an end of a tubular barrel connector 13008 that defines an internal annular recess 13008a, external radial mounting holes, 13008b and 13008c, radial passages, 13008d and 13008e, and external radial mounting holes, 13008f and 13008g and includes circumferentially spaced apart teeth 13008h at one end. A sealing cartridge 13010 is received within and coupled to the internal annular recess 13008a of the tubular barrel connector 13008 for fluidicly sealing the interface between the tubular barrel connector and the sealing cartridge. Torsional locking pins, 13012a and 13012b, are coupled to and mounted within the external radial mounting holes, 13008b and 13008c, respectively, of the tubular barrel connector 13008 and received within the radial passages, 13004c and 13004d, of the tubular actuator barrel 13004.

[0154] A tubular member 13014 that defines a longitudinal passage 13014a having one or more internal splines 13014b at one end and circumferentially spaced apart teeth 13014c at another end for engaging the circumferentially spaced apart teeth 13008h of the tubular barrel connector 13008 mates with and is received within the actuator barrel 13004 and the one end of the tubular member abuts an end face of the other end of the upper tubular support member 13002 and at another end abuts and end face of the tubular barrel connector 13008. A tubular guide member 13016 that defines a longitudinal passage 13016a having a tapered opening 13016aa, and radial passages, 13016b and 13016c, includes an external flange 13016d having an externally threaded connection at one end that

is received within and coupled to the internal annular recess 13002h of the upper tubular support member 13002.

[0155] The other end of the tubular barrel connector 13008 is threadably coupled to and is received within an end of a tubular actuator barrel 13018 that defines a longitudinal passage 13018a, radial passages, 13018b and 13018c, and radial passages, 13018d and 13018e. Torsional locking pins, 13020a and 13020b, are coupled to and mounted within the external radial mounting holes, 13008f and 13008g, respectively, of the tubular barrel connector 13008 and received within the radial passages, 13018b and 13018c, of the tubular actuator barrel 13018. The other end of the tubular actuator barrel 13018 receives and is threadably coupled to an end of a tubular barrel connector 13022 that defines an internal annular recess 13022a, external radial mounting holes, 13022b and 13022c, radial passages, 13022d and 13022e, and external radial mounting holes, 13022f and 13022g. A sealing cartridge 13024 is received within and coupled to the internal annular recess 13022a of the tubular barrel connector 13022 for fluidicly sealing the interface between the tubular barrel connector and the sealing cartridge. Torsional locking pins, 13024a and 13024b, are coupled to and mounted within the external radial mounting holes, 13022b and 13022c, respectively, of the barrel connector 13022 and received within the radial passages, 13018d and 13018e, of the tubular actuator barrel 13018.

[0156] The other end of the tubular barrel connector 13022 is threadably coupled to and is received within an end of a tubular actuator barrel 13026 that defines a longitudinal passage 13026a, radial passages, 13026b and 13026c, and radial passages, 13026d and 13026e. Torsional locking pins, 13028a and 13028b, are coupled to and mounted within the external radial mounting holes, 13022f and 13022g, respectively, of the tubular barrel connector 13022 and received within the radial passages, 13026b and 13026c, of the tubular actuator barrel 13026. The other end of the tubular actuator barrel 13026 receives and is threadably coupled to an end of a tubular barrel connector 13030 that defines an internal annular recess 13030a, external radial mounting holes, 13030b and 13030c, radial passages, 13030d and 13030e, and external radial mounting holes, 13030f and 13030g. A sealing cartridge 13032 is received within and coupled to the internal annular recess 13030a of the tubular barrel connector 13030 for fluidicly sealing the interface between the tubular barrel connector and the sealing cartridge. Torsional locking pins, 13034a and 13034b, are coupled to and mounted within the external radial mounting holes, 13030b and 13030c, respectively, of the tubular barrel connector 13030 and received within the radial passages, 13026d and 13026e, of the tubular actuator barrel 13026.

[0157] The other end of the tubular barrel connector 13030 is threadably coupled to and is received within an end of a tubular actuator barrel 13036 that defines a longitudinal passage 13036a, radial passages, 13036b and 13036c, and radial passages, 13036d and

13036e. Torsional locking pins, 13038a and 13038b, are coupled to and mounted within the external radial mounting holes, 13030f and 13030g, respectively, of the tubular barrel connector 13030 and received within the radial passages, 13036b and 13036c, of the tubular actuator barrel 13036. The other end of the tubular actuator barrel 13036 receives and is threadably coupled to an end of a tubular barrel connector 13040 that defines an internal annular recess 13040a, external radial mounting holes, 13040b and 13040c, radial passages, 13040d and 13040e, and external radial mounting holes, 13040f and 13040g. A sealing cartridge 13042 is received within and coupled to the internal annular recess 13040a of the tubular barrel connector 13040 for fluidicly sealing the interface between the tubular barrel connector and the sealing cartridge. Torsional locking pins, 13044a and 13044b, are coupled to and mounted within the external radial mounting holes, 13040b and 13040c, respectively, of the tubular barrel connector 13040 and received within the radial passages, 13036d and 13036e, of the tubular actuator barrel 13036.

[0158] The other end of the tubular barrel connector 13040 is threadably coupled to and is received within an end of a tubular actuator barrel 13046 that defines a longitudinal passage 13046a, radial passages, 13046b and 13046c, and radial passages, 13046d and 13046e. Torsional locking pins, 13048a and 13048b, are coupled to and mounted within the external radial mounting holes, 13040f and 13040g, respectively, of the tubular barrel connector 13040 and received within the radial passages, 13046b and 13046c, of the tubular actuator barrel 13046. The other end of the tubular actuator barrel 13046 receives and is threadably coupled to an end of a tubular barrel connector 13050 that defines an internal annular recess 13050a, external radial mounting holes, 13050b and 13050c, radial passages, 13050d and 13050e, and external radial mounting holes, 13050f and 13050g. A sealing cartridge 13052 is received within and coupled to the internal annular recess 13050a of the tubular barrel connector 13050 for fluidicly sealing the interface between the tubular barrel connector and the sealing cartridge. Torsional locking pins, 13054a and 13054b, are coupled to and mounted within the external radial mounting holes, 13050b and 13050c, respectively, of the tubular barrel connector 13050 and received within the radial passages, 13046d and 13046e, of the tubular actuator barrel 13046.

[0159] The other end of the tubular barrel connector 13050 is threadably coupled to and is received within an end of a tubular actuator barrel 13056 that defines a longitudinal passage 13056a, radial passages, 13056b and 13056c, and radial passages, 13056d and 13056e. Torsional locking pins, 13058a and 13058b, are coupled to and mounted within the external radial mounting holes, 13050f and 13050g, respectively, of the tubular barrel connector 13050 and received within the radial passages, 13056b and 13056c, of the tubular actuator barrel 13056. The other end of the tubular actuator barrel 13056 receives and is threadably coupled to an end of a tubular lower stop 13060 that defines an internal annular

recess 13060a, external radial mounting holes, 13060b and 13060c, and an internal annular recess 13060d that includes one or more circumferentially spaced apart locking teeth 13060e at one end and one or more circumferentially spaced apart locking teeth 13060f at the other end. A sealing cartridge 13062 is received within and coupled to the internal annular recess 13060a of the tubular lower stop 13060 for fluidicly sealing the interface between the tubular lower stop and the sealing cartridge. Torsional locking pins, 13064a and 13064b, are coupled to and mounted within the external radial mounting holes, 13060b and 13060c, respectively, of the tubular lower stop 13060 and received within the radial passages, 13056d and 13056e, of the tubular actuator barrel 13056.

[0160] A connector tube 13066 that defines a longitudinal passage 13066a and radial mounting holes, 13066b and 13066c, and includes external splines 13066d at one end for engaging the internal splines 13014b of the tubular member 13014 and radial mounting holes, 13066e and 13066f, at another end is received within and sealingly and movably engages the interior surface of the sealing cartridge 13010 mounted within the annular recess 13008a of the tubular barrel connector 13008. In this manner, during longitudinal displacement of the connector tube 13066 relative to the tubular barrel connector 13008, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the tubular barrel connector. An end of the connector tube 13066 also receives and mates with the other end of the tubular guide member 13016. Mounting screws, 13068a and 13068b, are coupled to and received within the radial mounting holes, 13066b and 13066c, respectively of the connector tube 13066.

[0161] The other end of the connector tube 13066 is received within and threadably coupled to an end of a tubular piston 13070 that defines a longitudinal passage 13070a, radial mounting holes, 13070b and 13070c, radial passages, 13070d and 13070e, and radial mounting holes, 13070f and 13070g, that includes a flange 13070h at one end. A sealing cartridge 13072 is mounted onto and sealingly coupled to the exterior of the tubular piston 13070 proximate the flange 13070h. The sealing cartridge 13072 also mates with and sealingly engages the interior surface of the tubular actuator barrel 13018. In this manner, during longitudinal displacement of the tubular piston 13070 relative to the actuator barrel 13018, a fluidic seal is maintained between the exterior surface of the piston and the interior surface of the actuator barrel. Mounting screws, 13074a and 13074b, are coupled to and mounted within the external radial mounting holes, 13070b and 13070c, respectively, of the tubular piston 13070 and received within the radial passages, 13066e and 13066f, of the connector tube 13066.

[0162] The other end of the tubular piston 13070 receives and is threadably coupled to an end of a connector tube 13076 that defines a longitudinal passage 13076a, radial mounting holes, 13076b and 13076c, at one end and radial mounting holes, 13076d and

13076e, at another end. The connector tube 13076 is received within and sealingly and movably engages the interior surface of the sealing cartridge 13024 mounted within the annular recess 13022a of the tubular barrel connector 13022. In this manner, during longitudinal displacement of the connector tube 13076 relative to the tubular barrel connector 13022, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the barrel connector. Mounting screws, 13078a and 13078b, are coupled to and mounted within the external radial mounting holes, 13070f and 13070g, respectively, of the tubular piston 13070 and received within the radial passages, 13076b and 13076c, of the connector tube 13076.

[0163] The other end of the connector tube 13076 is received within and threadably coupled to an end of a tubular piston 13080 that defines a longitudinal passage 13080a, radial mounting holes, 13080b and 13080c, radial passages, 13080d and 13080e, and radial mounting holes, 13080f and 13080g, that includes a flange 13080h at one end. A sealing cartridge 13082 is mounted onto and sealingly coupled to the exterior of the tubular piston 13080 proximate the flange 13080h. The sealing cartridge 13082 also mates with and sealingly engages the interior surface of the tubular actuator barrel 13026. In this manner, during longitudinal displacement of the tubular piston 13080 relative to the tubular actuator barrel 13026, a fluidic seal is maintained between the exterior surface of the piston and the interior surface of the actuator barrel. Mounting screws, 13084a and 13084b, are coupled to and mounted within the external radial mounting holes, 13080b and 13080c, respectively, of the tubular piston 13080 and received within the radial passages, 13076e and 13076f, of the connector tube 13076.

[0164] The other end of the tubular piston 13080 receives and is threadably coupled to an end of a connector tube 13086 that defines a longitudinal passage 13086a, radial mounting holes, 13086b and 13086c, at one end and radial mounting holes, 13086d and 13086e, at another end. The connector tube 13086 is received within and sealingly and movably engages the interior surface of the sealing cartridge 13032 mounted within the annular recess 13030a of the tubular barrel connector 13030. In this manner, during longitudinal displacement of the connector tube 13086 relative to the tubular barrel connector 13030, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the barrel connector. Mounting screws, 13088a and 13088b, are coupled to and mounted within the external radial mounting holes, 13080f and 13080g, respectively, of the tubular piston 13080 and received within the radial passages, 13086b and 13086c, of the connector tube 13086.

[0165] The other end of the connector tube 13086 is received within and threadably coupled to an end of a tubular piston 13090 that defines a longitudinal passage 13090a, radial mounting holes, 13090b and 13090c, radial passages, 13090d and 13090e, and radial

mounting holes, 13090f and 13090g, that includes a flange 13090h at one end. A sealing cartridge 13092 is mounted onto and sealingly coupled to the exterior of the tubular piston 13090 proximate the flange 13090h. The sealing cartridge 13092 also mates with and sealingly engages the interior surface of the tubular actuator barrel 13036. In this manner, during longitudinal displacement of the tubular piston 13090 relative to the tubular actuator barrel 13036, a fluidic seal is maintained between the exterior surface of the piston and the interior surface of the actuator barrel. Mounting screws, 13094a and 13094b, are coupled to and mounted within the external radial mounting holes, 13090b and 13090c, respectively, of the tubular piston 13090 and received within the radial passages, 13086e and 13086f, of the connector tube 13086.

[0166] The other end of the tubular piston 13090 receives and is threadably coupled to an end of a connector tube 13096 that defines a longitudinal passage 13096a, radial mounting holes, 13096b and 13096c, at one end and radial mounting holes, 13096d and 13096e, at another end. The connector tube 13096 is received within and sealingly and movably engages the interior surface of the sealing cartridge 13042 mounted within the annular recess 13040a of the tubular barrel connector 13040. In this manner, during longitudinal displacement of the connector tube 13096 relative to the tubular barrel connector 13040, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the barrel connector. Mounting screws, 13098a and 13098b, are coupled to and mounted within the external radial mounting holes, 13090f and 13090g, respectively, of the tubular piston 13090 and received within the radial passages, 13096b and 13096c, of the connector tube 13096.

[0167] The other end of the connector tube 13096 is received within and threadably coupled to an end of a tubular piston 13100 that defines a longitudinal passage 13100a, radial mounting holes, 13100b and 13100c, radial passages, 13100d and 13100e, and radial mounting holes, 13100f and 13100g, that includes a flange 13100h at one end. A sealing cartridge 13102 is mounted onto and sealingly coupled to the exterior of the tubular piston 13100 proximate the flange 13100h. The sealing cartridge 13102 also mates with and sealingly engages the interior surface of the tubular actuator barrel 13046. In this manner, during longitudinal displacement of the tubular piston 13100 relative to the tubular actuator barrel 13046, a fluidic seal is maintained between the exterior surface of the piston and the interior surface of the actuator barrel. Mounting screws, 13104a and 13104b, are coupled to and mounted within the external radial mounting holes, 13100b and 13100c, respectively, of the tubular piston 13100 and received within the radial passages, 13096e and 13096f, of the connector tube 13096.

[0168] The other end of the tubular piston 13100 receives and is threadably coupled to an end of a connector tube 13106 that defines a longitudinal passage 13106a, radial

mounting holes, 13106b and 13106c, at one end and radial mounting holes, 13106d and 13106e, at another end. The connector tube 13106 is received within and sealingly and movably engages the interior surface of the sealing cartridge 13052 mounted within the annular recess 13050a of the tubular barrel connector 13050. In this manner, during longitudinal displacement of the connector tube 13106 relative to the tubular barrel connector 13050, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the barrel connector. Mounting screws, 13108a and 13108b, are coupled to and mounted within the external radial mounting holes, 13100f and 13100g, respectively, of the tubular piston 13100 and received within the radial passages, 13106b and 13106c, of the connector tube 13106.

[0169] The other end of the connector tube 13106 is received within and threadably coupled to an end of a tubular piston 13110 that defines a longitudinal passage 13110a, radial mounting holes, 13110b and 13110c, radial passages, 13110d and 13110e, radial mounting holes, 13110f and 13110g, that includes a flange 13110h at one end and circumferentially spaced teeth 13110i at another end for engaging the one or more circumferentially spaced apart locking teeth 13060e of the tubular lower stop 13060. A sealing cartridge 13112 is mounted onto and sealingly coupled to the exterior of the tubular piston 13110 proximate the flange 13110h. The sealing cartridge 13112 also mates with and sealingly engages the interior surface of the actuator barrel 13056. In this manner, during longitudinal displacement of the tubular piston 13110 relative to the actuator barrel 13056, a fluidic seal is maintained between the exterior surface of the piston and the interior surface of the actuator barrel. Mounting screws, 13114a and 13114b, are coupled to and mounted within the external radial mounting holes, 13110b and 13110c, respectively, of the tubular piston 13110 and received within the radial passages, 13106d and 13106e, of the connector tube 13106.

[0170] The other end of the tubular piston 13110 receives and is threadably coupled to an end of a connector tube 13116 that defines a longitudinal passage 13116a, radial mounting holes, 13116b and 13116c, at one end and radial mounting holes, 13116d and 13116e, at another end that includes an external flange 13116f that includes circumferentially spaced apart teeth 13116g that extend from an end face of the external flange for engaging the teeth 13060f of the tubular lower stop 13060, and an externally threaded connection 13116h at another end. The connector tube 13116 is received within and sealingly and movably engages the interior surface of the sealing cartridge 13062 mounted within the annular recess 13060a of the lower tubular stop 13060. In this manner, during longitudinal displacement of the connector tube 13116 relative to the lower tubular stop 13060, a fluidic seal is maintained between the exterior surface of the connector tube and the interior surface of the lower tubular stop. Mounting screws, 13118a and 13118b, are

coupled to and mounted within the external radial mounting holes, 13110f and 13110g, respectively, of the tubular piston 13110 and received within the radial passages, 13116b and 13116c, of the connector tube 13116.

[0171] In an exemplary embodiment, as illustrated in Figs. 13A1 to 13A8, the internally threaded connection 13002e of the upper tubular support member 13002 receives and is coupled to the externally threaded connection 1234g of the lower mandrel 1234 of the ball grabber assembly 16 and the externally threaded connection 13116h of the connector tube 13116 is received within and is coupled to an internally threaded connection 20a of an end of the safety sub assembly 20.

[0172] In an exemplary embodiment, as illustrated in Figs. 13A1 to 13A8, during operation of the tension actuator assembly 18, the tension actuator assembly is positioned within the expandable wellbore casing 100 and fluidic material 13200 is injected into the tension actuator assembly through the passages 13002a, 13016a, 13066a, 13070a, 13076a, 13080a, 13086a, 13090a, 13096a, 13100a, 13106a, 13110a, and 13116a. The injected fluidic material 13200 will also pass through the radial passages, 13070d and 13070e, 13080d and 13080e, 13090d and 13090e, 13100d and 13100e, 13110d and 13110e, of the tubular pistons, 13070, 13080, 13090, 13100, and 13110, respectively, into annular piston chambers, 13202, 13204, 13206, 13208, 13208, and 13210.

[0173] As illustrated in Figs. 13B1 to 13B7, the operating pressure of the fluidic material 13200 may then be increased by, for example, controllably blocking or limiting the flow of the fluidic material through the passage 13116a and/or increasing the operating pressure of the outlet of a pumping device for injecting the fluidic material 13200 into the tension actuator assembly 18. As a result, of the increased operating pressure of the fluidic material 13200 within the tension actuator assembly 18, the operating pressures of the annular piston chambers, 13202, 13204, 13206, 13208, 13208, and 13210, will be increased sufficiently to displace the tubular pistons, 13070, 13080, 13090, 13100, and 13110, upwardly in the direction 13212 thereby also displacing the connector tube 13116. As a result, a upward tensile force is applied to all elements of the system 10 coupled to and positioned below the connector tube 13116. In an exemplary embodiment, during the upward displacement of the tubular pistons, 13070, 13080, 13090, 13100, and 13110, fluidic materials displaced by the tubular pistons within discharge annular chambers, 13214, 13216, 13218, 13220, and 13222 are exhausted out of the tension actuator assembly 18 through the radial passages, 13008d and 13008e, 13022d and 13022e, 13030d and 13030e, 13040d and 13040e, 13050d and 13050e, respectively. Furthermore, in an exemplary embodiment, the upward displacement of the tubular pistons, 13070, 13080, 13090, 13100, and 13110, further causes the external splines 13066d of the connector tube 13066 to engage the internal splines 13014b of the tubular member 13014 and the circumferentially spaced apart teeth 13116g of the connector

tube 13116 to engage the circumferentially spaced teeth 13060f of the tubular lower stop 13060. As a result of the interaction of the external splines 13066d of the connector tube 13066 to engage the internal splines 13014b of the tubular member 13014 and the circumferentially spaced apart teeth 13116g of the connector tube 13116 to engage the circumferentially spaced teeth 13060f of the tubular lower stop 13060, torsional loads may be transmitted through the tension actuator assembly 18.

[0174] In an exemplary embodiment, the sealing cup assembly 22 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US02/36157, attorney docket number 25791.87.02, filed on 11/12/2002, (2) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (3) PCT patent application serial number PCT/US03/04837, attorney docket number 25791.95.02, filed on 2/29/2003, (4) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, (5) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, and/or (6) PCT patent application serial number PCT/US03/18530, attorney docket number 25791.108.02, filed on 6/11/2003, the disclosures of which are incorporated herein by reference.

[0175] In an exemplary embodiment, the casing lock assembly 24 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (2) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, and/or (3) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, the disclosures of which are incorporated herein by reference.

[0176] In an exemplary embodiment, the adjustable bell section expansion cone assembly 28 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US02/36157, attorney docket number 25791.87.02, filed on 11/12/02, (2) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (3) PCT patent application serial number PCT/US03/04837, attorney docket number 25791.95.02, filed on 2/29/03, (4) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, (5) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, and/or (6) PCT patent application serial number PCT/US03/18530, attorney docket number 25791.108.02, filed on 6/11/2003, the disclosures of which are incorporated herein by reference.

[0177] In an alternative embodiment, the adjustable bell section expansion cone assembly 28 further incorporates one or more of the elements and/or teachings of the casing cutter assembly 14 for sensing the internal diameter of the expandable wellbore casing 100.

[0178] In an exemplary embodiment, the adjustable casing expansion cone assembly 30 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US02/36157, attorney docket number 25791.87.02, filed on 11/12/02, (2) PCT patent application serial number PCT/US02/36267, attorney docket number 25791.88.02, filed on 11/12/2002, (3) PCT patent application serial number PCT/US03/04837, attorney docket number 25791.95.02, filed on 2/29/03, (4) PCT patent application serial number PCT/US03/29859, attorney docket no. 25791.102.02, filed on 9/22/2003, (5) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, and/or (6) PCT patent application serial number PCT/US03/18530, attorney docket number 25791.108.02, filed on 6/11/2003, the disclosures of which are incorporated herein by reference.

[0179] In an alternative embodiment, the adjustable casing expansion cone assembly 30 further incorporates one or more of the elements and/or teachings of the casing cutter assembly 14 for sensing the internal diameter of the expandable wellbore casing 100.

[0180] In an exemplary embodiment, as illustrated in 14A to 14C, the packer setting tool assembly 32 includes a tubular adaptor 1402 that defines a longitudinal passage 1402a, radial external mounting holes, 1402b and 1402c, radial passages, 1402d and 1402e, and includes an external threaded connection 1402f at one end and an internal annular recess 1402g having an internal threaded connection at another end. An external threaded connection 1404a of an end of a tubular upper mandrel 1404 that defines a longitudinal passage 1404b, internally threaded external mounting holes, 1404c and 1404d, and includes an external annular recess 1404e, external annular recess 1404f, external annular recess 1404g, external flange 1404h, external splines 1404i, and an internal threaded connection 1404j at another end is received within and is coupled to the internally threaded connection of the internal annular recess 1402g of the other end of the tubular adaptor 1402. Mounting screws, 1405a and 1405b, are received within and coupled to the mounting holes, 1404c and 1404d, of the tubular upper mandrel 1404 that also extend into the radial passages, 1402d and 1402e, of the tubular adaptor 1402.

[0181] An external threaded connection 1406a of an end of a mandrel 1406 that defines a longitudinal passage 1406b and includes an external annular recess 1406c and an external annular recess 1406d having an external threaded connection is received within and is coupled to the internal threaded connection 1404j of the tubular upper mandrel 1404. An internal threaded connection 1408a of a tubular stinger 1408 that defines a longitudinal

passage 1408b and includes an external annular recess 1408c, and an external tapered annular recess 1408d and an engagement shoulder 1408e at another end receives and is coupled to the external threaded connection of the external annular recess 1406d of the mandrel 1406. A sealing member 1410 is mounted upon and coupled to the external annular recess 1406d of the mandrel 1406.

[0182] An internal flange 1412a of a tubular key 1412 that includes an external annular recess 1412b at one end and an internal annular recess 1412c at another end is movably received within and engages the external annular recess 1404f of the tubular upper mandrel 1404. A garter spring 1414 is received within and engages the external annular recess 1412b of the tubular key 1412.

[0183] An end of a tubular bushing 1416 that defines a longitudinal passage 1416a for receiving and mating with the upper mandrel 1404, and radial passages, 1416b and 1416c, and includes an external threaded connection 1416d at an intermediate portion, and an external flange 1416e, an internal annular recess 1416f, circumferentially spaced apart teeth 1416g, and external flanges, 1416h and 1416i, at another end is received within and mates with the internal annular recess 1412c of the tubular key 1412. An internal threaded connection 1418a of a tubular drag block body 1418 that defines a longitudinal passage 1418b for receiving the tubular bushing 1416, mounting holes, 1418c and 1418d, mounting holes, 1418e and 1418f, and includes an internal threaded connection 1418g at one end, a centrally positioned external annular recess 1418h, and an external threaded connection 1418i at another end is received within and coupled to the external threaded connection 1416d of the tubular bushing 1416.

[0184] A first tubular keeper 1420 that defines mounting holes, 1420a and 1420b, is coupled to an end of the tubular drag block body 1418 by mounting screws, 1422a and 1422b, that are received within and are coupled to the mounting holes, 1418c and 1418d, of the tubular drag block body. A second tubular keeper 1424 that defines mounting holes, 1424a and 1424b, is coupled to an end of the tubular drag block body 1418 by mounting screws, 1426a and 1426b, that are received within and are coupled to the mounting holes, 1418e and 1418f, of the tubular drag block body.

[0185] Drag blocks, 1428 and 1430, that are received within the external annular recess 1418h of the tubular drag block body 1418, include ends that mate with and are received within the end of the first tubular keeper 1420, and other ends that mate with and are received within the end of the second tubular keeper 1424. The drag blocks, 1428 and 1430, further include internal annular recesses, 1428a and 1430a, respectively, that receive and mate with ends of springs, 1432 and 1434, respectively. The springs, 1432 and 1434, also receive and mate with the external annular recess 1418h of the tubular drag block body 1418.

[0186] An external threaded connection 1436a of an end of a tubular releasing cap extension 1436 that defines a longitudinal passage 1436b and includes an internal annular recess 1436c and an internal threaded connection 1436d at another end is received within and is coupled to the internal threaded connection 1418g of the tubular drag block body 1418. An external threaded connection 1438a of an end of a tubular releasing cap 1438 that defines a longitudinal passage 1438b and includes an internal annular recess 1438c is received within and coupled to the internal threaded connection 1436d of the tubular releasing cap extension 1436. A sealing element 1440 is received within the internal annular recess 1438c of the tubular releasing cap 1438 for fluidicly sealing the interface between the tubular releasing cap and the upper mandrel 1404.

[0187] An internal threaded connection 1442a of an end of a tubular setting sleeve 1442 that defines a longitudinal passage 1442b, radial passage 1442c, radial passages, 1442d and 1442e, radial passage 1442f, and includes an internal flange 1442g at another end receives the external threaded connection 1418i of the tubular drag block body 1418. An internal flange 1444a of a tubular coupling ring 1444 that defines a longitudinal passage 1444b and radial passages, 1444c and 1444d, receives and mates with the external flange 1416h of the tubular bushing 1416 and an end face of the internal flange of the tubular coupling ring is positioned proximate and in opposing relation to an end face of the external flange 1416i of the tubular bushing.

[0188] An internal flange 1446a of a tubular retaining collet 1446 that includes a plurality of axially extending collet fingers 1446b, each having internal flanges 1446c at an end of each collet finger, for engaging and receiving the tubular coupling ring 1444 receives and mates with external flange 1416e of the tubular bushing 1416 and an end face of the internal flange of the tubular retaining collet is positioned proximate and in opposing relation to an end face of the external flange 1416h of the tubular bushing.

[0189] In an exemplary embodiment, the packer assembly 36 operates and is provided substantially, at least in part, as disclosed in one or more of the following: (1) PCT patent application serial number PCT/US03/14153, attorney docket number 25791.104.02, filed on 11/13/2003, and/or (2) PCT patent application serial number PCT/US03/29460, attorney docket number 25791.114.02, filed on 9/23/2003, the disclosures of which are incorporated herein by reference.

[0190] In an exemplary embodiment, as illustrated in Figs. 15-1 to 15-5, the packer assembly 36 includes a tubular upper adaptor 1502 that defines a longitudinal passage 1502a having a tapered opening 1502b and mounting holes, 1502c and 1502d, that includes a plurality of circumferentially spaced apart teeth 1502e at one end, an external flange 1502f, and an internal threaded connection 1502g at another end. In an exemplary embodiment, the tubular upper adaptor 1502 is fabricated from aluminum. An external

threaded connection 1504a of an end of a tubular upper mandrel 1504 that defines a longitudinal passage 1504b, mounting holes, 1504c and 1504d, mounting holes, 1504e and 1504f, and mounting holes, 1504g and 1504h, and includes an external flange 1504i, an internal annular recess 1504j, and an internal threaded connection 1504k at another end is received within and coupled to the internal threaded connection 1502g of the tubular upper adaptor 1502. In an exemplary embodiment, the tubular upper mandrel 1504 is fabricated from aluminum.

[0191] An upper tubular spacer ring 1506 that defines mounting holes, 1506a and 1506b, receives and mates with the end of the tubular upper mandrel 1504 and includes an angled end face 1506c and another end face that is positioned proximate to an end face of the tubular upper adaptor 1502 is coupled to the tubular upper mandrel by shear pins, 1508a and 1508b, that are mounted within and coupled to the mounting holes, 1504c and 1506a, and, 1504d and 1506b, respectively, of the tubular upper mandrel and upper tubular spacer ring, respectively. A lower tubular spacer ring 1510 that includes an angled end face 1510a receives, mates, and is coupled to the other end of the tubular upper mandrel 1504 and includes another end face that is positioned proximate to an end face of the external flange 1504i of the tubular upper mandrel 1504. In an exemplary embodiment, the upper and tubular spacer rings, 1506 and 1510, are fabricated from a composite material.

[0192] An upper tubular slip 1512 that receives and is movably mounted upon the tubular upper mandrel 1504 defines a longitudinal passage 1512a having a tapered opening 1512b and includes external annular recesses, 1512c, 1512d, 1512e, 1512f, and 1512g, and an angled end face 1512h that mates with and is positioned proximate the angled end face 1506c of the upper tubular spacer ring 1506. Slip retaining bands, 1514a, 1514b, 1514c, 1514d, and 1514e, are received within and coupled to the external annular recesses, 1512c, 1512d, 1512e, 1512f, and 1512g, of the upper tubular slip 1512. A lower tubular slip 1516 that receives and is movably mounted upon the tubular upper mandrel 1504 defines a longitudinal passage 1516a having a tapered opening 1516b and includes external annular recesses, 1516c, 1516d, 1516e, 1516f, and 1516g, and an angled end face 1516h that mates with and is positioned proximate the angled end face 1510a of the lower tubular spacer ring 1510. Slip retaining bands, 1518a, 1518b, 1518c, 1518d, and 1518e, are received within and coupled to the external annular recesses, 1516c, 1516d, 1516e, 1516f, and 1516g, of the lower tubular slip 1516. In an exemplary embodiment, the upper and lower tubular slips, 1512 and 1516, are fabricated from composite materials, and at least some of the slip retaining bands, 1514a, 1514b, 1514c, 1514d, 1514e, 1518a, 1518b, 1518c, 1518d, and 1518e are fabricated from carbide insert materials.

[0193] An upper tubular wedge 1520 that defines an longitudinal passage 1520a for receiving the tubular upper mandrel 1504 and mounting holes, 1520b and 1520c, and

includes an angled end face 1520d at one end that is received within and mates with the tapered opening 1512b of the upper tubular slip 1512, and an angled end face 1520e at another end is coupled to the tubular upper mandrel by shear pins, 1522a and 1522b, mounted within and coupled to the mounting holes, 1504e and 1520b, and, 1504f and 1520c, respectively, of the tubular upper mandrel and upper tubular wedge, respectively. A lower tubular wedge 1524 that defines an longitudinal passage 1524a for receiving the tubular upper mandrel 1504 and mounting holes, 1524b and 1524c, and includes an angled end face 1524d at one end that is received within and mates with the tapered opening 1516b of the lower tubular slip 1516, and an angled end face 1524e at another end is coupled to the tubular upper mandrel by shear pins, 1526a and 1526b, mounted within and coupled to the mounting holes, 1504g and 1524b, and, 1504h and 1524c, respectively, of the tubular upper mandrel and lower tubular wedge, respectively. In an exemplary embodiment, the upper and lower tubular wedges, 1520 and 1524, are fabricated from composite materials.

[0194] An upper tubular extrusion limiter 1528 that defines a longitudinal passage 1528a for receiving the tubular upper mandrel 1504 includes an angled end face 1528b at one end that mates with the angled end face 1520e of the upper tubular wedge 1520, an angled end face 1528c at another end having recesses 1528d, and external annular recesses, 1528e, 1528f and 1528g. Retaining bands, 1530a, 1530b, and 1530c, are mounted within and coupled to the external annular recesses, 1528e, 1528f and 1528g, respectively, of the upper tubular extrusion limiter 1528. Circular disc-shaped extrusion preventers 1532 are coupled and mounted within the recesses 1528d. A lower tubular extrusion limiter 1534 that defines a longitudinal passage 1534a for receiving the tubular upper mandrel 1504 includes an angled end face 1534b at one end that mates with the angled end face 1524e of the lower tubular wedge 1524, an angled end face 1534c at another end having recesses 1534d, and external annular recesses, 1534e, 1534f and 1534g. Retaining bands, 1536a, 1536b, and 1536c, are mounted within and coupled to the external annular recesses, 1534e, 1534f and 1534g, respectively, of the lower tubular extrusion limiter 1534. Circular disc-shaped extrusion preventers 1538 are coupled and mounted within the recesses 1534d. In an exemplary embodiment, the upper and lower extrusion limiters, 1528 and 1534, are fabricated from composite materials.

[0195] An upper tubular elastomeric packer element 1540 that defines a longitudinal passage 1540a for receiving the tubular upper mandrel 1504 includes an angled end face 1540b at one end that mates with and is positioned proximate the angled end face 1528c of the upper tubular extrusion limiter 1528 and an curved end face 1540c at another end. A lower tubular elastomeric packer element 1542 that defines a longitudinal passage 1542a for receiving the tubular upper mandrel 1504 includes an angled end face 1542b at one end that

mates with and is positioned proximate the angled end face 1534c of the lower tubular extrusion limiter 1534 and an curved end face 1542c at another end.

[0196] A central tubular elastomeric packer element 1544 that defines a longitudinal passage 1544a for receiving the tubular upper mandrel 1504 includes a curved outer surface 1544b for mating with and engaging the curved end faces, 1540c and 1542c, of the upper and lower tubular elastomeric packer elements, 1540 and 1542, respectively.

[0197] An external threaded connection 1546a of a tubular lower mandrel 1546 that defines a longitudinal passage 1546b having throat passages, 1546c and 1546d, and flow ports, 1546e and 1546f, and a mounting hole 1546g, and includes an internal annular recess 1546h at one end, and an external flange 1546i, internal annular recess 1546j, and internal threaded connection 1546k at another end. In an exemplary embodiment, the tubular lower mandrel 1546 is fabricated from aluminum. A sealing element 1548 is received within the inner annular recess 1504j of the other end of the tubular upper mandrel 1504 for sealing an interface between the tubular upper mandrel and the tubular lower mandrel 1546.

[0198] A tubular sliding sleeve valve 1550 that defines a longitudinal passage 1550a and radial flow ports, 1550b and 1550c, and includes collet fingers 1550d at one end for engaging the internal annular recess 1546h of the lower tubular mandrel 1546, an external annular recess 1550e, an external annular recess 1550f, an external annular recess 1550g, and circumferentially spaced apart teeth 1550h at another end is received within and is slidably coupled to the longitudinal passage 1546b of the tubular lower mandrel 1546. In an exemplary embodiment, the tubular sliding sleeve valve 1550 is fabricated from aluminum. A set screw 1552 is mounted within and coupled to the mounting hole 1546g of the tubular lower mandrel 1546 that is received within the external annular recess 1550e of the tubular sliding sleeve 1550. Sealing elements, 1554 and 1556, are mounted within the external annular recesses, 1550f and 1550g, respectively, of the tubular sliding sleeve valve 1550 for sealing an interface between the tubular sliding sleeve valve and the tubular lower mandrel 1546.

[0199] An end of a tubular outer sleeve 1558 that defines a longitudinal passage 1558a, radial passages, 1558b and 1558c, upper flow ports, 1558d and 1558e, lower flow ports, 1558f and 1558g, and radial passages, 1558h and 1558i, receives, mates with, and is coupled to the other end of the tubular upper mandrel 1504 and an end face of the end of the tubular outer sleeve is positioned proximate and end face of the lower tubular spacer ring 1510. The other end of the tubular outer sleeve 1558 receives, mates with, and is coupled to the other end of the tubular lower mandrel 1546.

[0200] An external threaded connection 1560a of an end of a tubular bypass mandrel 1560 that defines a longitudinal passage 1560b, upper flow ports, 1560c and 1560d, lower flow ports, 1560e and 1560f, and a mounting hole 1560g and includes an internal annular

recess 1560h and an external threaded connection 1560i at another end is received within and coupled to the internal threaded connection 1546k of the tubular lower mandrel 1546. A sealing element 1562 is received within the internal annular recess 1546j of the tubular lower mandrel 1546 for sealing an interface between the tubular lower mandrel and the tubular bypass mandrel 1560.

[0201] A tubular plug seat 1564 that defines a longitudinal passage 1564a having a tapered opening 1564b at one end, and flow ports, 1564c and 1564d, and includes an external annular recess 1564e, an external annular recess 1564f, an external annular recess 1564g, an external annular recess 1564h, and an external annular recess 1564i having an external threaded connection at another end is received within and is movably coupled to the longitudinal passage 1560b of the tubular bypass mandrel 1560. A tubular nose 1566 is threadably coupled to and mounted upon the external annular recess 1564i of the tubular plug seat 1564. In an exemplary embodiment, the tubular plug seat 1564 is fabricated from aluminum. Sealing elements, 1568, 1570, and 1572, are received within the external annular recesses, 1564e, 1564g, and 1564h, respectively, of the tubular plug seat 1564 for sealing an interface between the tubular plug seat and the tubular bypass mandrel 1560. A set screw 1574 is mounted within and coupled to the mounting hole 1560g of the tubular bypass mandrel 1560 that is received within the external annular recess 1564f of the tubular plug seat 1564.

[0202] An end of a tubular bypass sleeve 1576 that defines a longitudinal passage 1576a and includes an internal annular recess 1576b at one end and an internal threaded connection 1576c at another end is coupled to the other end of the tubular outer sleeve 1558 and mates with and receives the tubular bypass mandrel 1560. In an exemplary embodiment, the tubular bypass sleeve 1576 is fabricated from aluminum.

[0203] An external threaded connection 1578a of a tubular valve seat 1578 that defines a longitudinal passage 1578b including a valve seat 1578c and up-jet flow ports, 1578d and 1578e, and includes a spring retainer 1578f and an external annular recess 1578g is received within and is coupled to the internal threaded connection 1576c of the tubular bypass sleeve 1576. In an exemplary embodiment, the tubular valve seat 1578 is fabricated from aluminum. A sealing element 1580 is received within the external annular recess 1578g of the tubular valve seat 1578 for fluidicly sealing an interface between the tubular valve seat and the tubular bypass sleeve 1576.

[0204] A poppet valve 1582 mates with and is positioned within the valve seat 1578c of the tubular valve seat 1578. An end of the poppet valve 1582 is coupled to an end of a stem bolt 1584 that is slidingly supported for longitudinal displacement by the spring retainer 1578f A valve spring 1586 that surrounds a portion of the stem bolt 1584 is positioned in opposing relation to the head of the stem bolt and a support 1578fa of the spring retainer 1578f.for

biasing the poppet valve 1582 into engagement with the valve seat 1578c of the tubular valve seat 1578.

[0205] An end of a composite nose 1588 that defines a longitudinal passage 1588a and mounting holes, 1588b and 1588c, and includes an internal threaded connection 1588d at another end receives, mates with, and is coupled to the other end of the tubular valve seat 1578. A tubular nose sleeve 1590 that defines mounting holes, 1590a and 1590b, is coupled to the composite nose 1588 by shear pins, 1592a and 1592b, that are mounted in and coupled to the mounting holes, 1588b and 1590a, and, 1588c and 1590b, respectively, of the composite nose and tubular nose sleeve, respectively.

[0206] An external threaded connection 1594a of a baffle nose 1594 that defines longitudinal passages, 1594b and 1594c, is received within and is coupled to the internal threaded connection internal threaded connection 1588d of the composite nose 1588.

[0207] In an exemplary embodiment, as illustrated in Figs. 16A1 to 16A5, during the operation of the packer setting tool assembly 32 and packer assembly 36, the packer setting tool and packer assembly are coupled to one another by inserting the end of the tubular upper adaptor 1502 into the other end of the tubular coupling ring 1444, bringing the circumferentially spaced teeth 1416g of the other end of the tubular bushing 1416 into engagement with the circumferentially spaced teeth 1502e of the end of the tubular upper adaptor, and mounting shear pins, 1602a and 1602b, within the mounting holes, 1444c and 1502c, and, 1444d and 1502d, respectively, of the tubular coupling ring and tubular upper adaptor, respectively. As a result, the tubular mandrel 1406 and tubular stinger 1408 of the packer setting tool assembly 32 are thereby positioned within the longitudinal passage 1504a of the tubular upper mandrel 1504 with the 1408e of the tubular stinger positioned within the longitudinal passage 1546b of the tubular lower mandrel 1546 proximate the collet fingers 1550d of the tubular sliding sleeve valve 1550.

[0208] Furthermore, in an exemplary embodiment, during the operation of the packer setting tool 32 and packer assembly 36, as illustrated in Figs. 16A1 to 16A5, the packer setting tool and packer assembly are positioned within the expandable wellbore casing 100 and an internal threaded connection 30a of an end of the adjustable casing expansion cone assembly 30 receives and is coupled to the external threaded connection 1402f of the end of the tubular adaptor 1402 of the packer setting tool assembly. Furthermore, shear pins, 1604a and 1604b, mounted within the mounting holes, 1558b and 1558c, of the tubular outer sleeve 1558 couple the tubular outer sleeve to the expandable wellbore casing. As a result, torsion loads may transferred between the tubular outer sleeve 1558 and the expandable wellbore casing 100.

[0209] In an exemplary embodiment, as illustrated in Figs. 16B1 to 16B5, a conventional plug 1606 is then injected into the setting tool assembly 32 and packer assembly 36 by

injecting a fluidic material 1608 into the setting tool assembly and packer assembly through the longitudinal passages, 1402a, 1404b, 1406b, 1408b, 1550a, 1546a, 1560b, and 1564a of the tubular adaptor 1402, tubular upper mandrel 1404, tubular mandrel 1406, tubular stinger 1408, tubular sliding sleeve valve 1550, tubular lower mandrel 1546, tubular bypass mandrel 1560, and tubular plug seat 1564, respectively. The plug 1606 is thereby positioned within the longitudinal passage 1564a of the tubular plug seat 1564. Continued injection of the fluidic material 1608 following the seating of the plug 1606 within the longitudinal passage 1564a of the tubular plug seat 1564 causes the plug and the tubular plug seat to be displaced downwardly in a direction 1610 until further movement of the tubular plug seat is prevented by interaction of the set screw 1574 with the external annular recess 1564f of the tubular plug seat. As a result, the flow ports, 1564c and 1564d, of the tubular plug seat 1564 are moved out of alignment with the upper flow ports,1560c and 1560d, of the tubular bypass mandrel 1560.

[0210] In an exemplary embodiment, as illustrated in Figs. 16C1 to 16C5, after the expandable wellbore casing 100 has been radially expanded and plastically deformed to form at least the bell section 112 of the expandable wellbore casing 100 thereby shearing the shear pins, 1604a and 1604b, the setting tool assembly 32 and packer assembly 36 are then moved upwardly to a position within the expandable wellbore casing 100 above the bell section. The tubular adaptor 1402 is then rotated, by rotating the tool string of the system 10 above the setting tool assembly 32, to displace and position the drag blocks, 1428 and 1430, into engagement with the interior surface of the expandable wellbore casing 100.

[0211] As a result of the engagement of the drag blocks, 1428 and 1430, with the interior surface of the expandable wellbore casing 100, further rotation of the drag blocks relative to the wellbore casing is prevented. Consequently, due to the operation and interaction of the threaded connections, 1416d and 1418a, of the tubular bushing 1416 and tubular drag block body 1418, respectively, further rotation of the tubular adaptor 1402 causes the tubular drag block body and setting sleeve 1442 to be displaced downwardly in a direction 1612 relative to the remaining elements of the setting tool assembly 32 and packer assembly 36. As a result, the setting sleeve 1442 engages and displaces the upper tubular spacer ring 1506 thereby shearing the shear pins, 1522a and 1522b, and driving the upper tubular slip 1512 onto and up the angled end face 1520d of the upper tubular wedge 1520 and into engagement with the interior surface of the expandable wellbore casing 100. As a result, longitudinal displacement of the upper tubular slip 1512 relative to the expandable wellbore casing 100 is prevented. Furthermore, as a result, the 1446b collet fingers of the tubular retaining collet 1446 are disengaged from the tubular upper adaptor 1502.

[0212] In an alternative embodiment, after the drag blocks, 1428 and 1430, engage the interior surface of the expandable wellbore casing 100, an upward tensile force is applied to

the tubular support member 12, and the ball gripper assembly 16 is then operate to engage the interior surface of the expandable wellbore casing. The tension actuator assembly 18 is then operated to apply an upward tensile force to the tubular adaptor 1402 thereby pulling the upper tubular spacer ring 1506, lower tubular spacer ring 1510, upper tubular slip 1512, lower tubular slip 1516, upper tubular wedge 1520, lower tubular wedge 1524, upper tubular extrusion limiter 1528, lower tubular extrusion limiter 1534, and central tubular elastomeric element 1544 upwardly into contact with the 1442 thereby compressing the upper tubular spacer ring, lower tubular spacer ring, upper tubular slip, lower tubular slip, upper tubular wedge, lower tubular wedge, upper tubular extrusion limiter, lower tubular extrusion limiter, and central tubular elastomeric element. As a result, the upper tubular slip 1512, lower tubular slip 1516, and central tubular elastomeric element 1544 engage the interior surface of the expandable wellbore casing 100.

[0213] In an exemplary embodiment, as illustrated in Figs. 16D1 to 16D5, an upward tensile force is then applied to the tubular adaptor 1402 thereby compressing the lower tubular slip 1516, lower tubular wedge 1524, central elastomeric packer element 1544, upper tubular extrusion limiter 1528, and upper tubular wedge 1520 between the lower tubular spacer ring 1510 and the stationary upper tubular slip 1512. As a result, the lower tubular slip 1516 is driven onto and up the angled end face 1524d of the lower tubular wedge 1524 and into engagement with the interior surface of the expandable wellbore casing 100, and the central elastomeric packer element 1544 is compressed radially outwardly into engagement with the interior surface of the expandable tubular member. As a result, further longitudinal displacement of the upper tubular slip 1512, lower tubular slip 1516, and central elastomeric packer element 1544 relative to the expandable wellbore casing 100 is prevented.

[0214] In an exemplary embodiment, as illustrated in Figs. 16E1 to 16E6, continued application of the upward tensile force to tubular adaptor 1402 will then shear the shear pins, 1602a and 1602b, thereby disengaging the setting tool assembly 32 from the packer assembly 36.

[0215] In an exemplary embodiment, as illustrated in Figs. 16F1 to 16F6, with the drag blocks, 1428 and 1430, in engagement with the interior surface of the expandable wellbore casing 100, the tubular adaptor 102 is further rotated thereby causing the tubular drag block body 1418 and setting sleeve 1442 to be displaced further downwardly in the direction 1612 until the tubular drag block body and setting sleeve are disengaged from the tubular stinger 1408. As a result, the tubular stinger 1408 of the setting tool assembly 32 may then be displaced downwardly into complete engagement with the tubular sliding sleeve valve 1550.

[0216] In an exemplary embodiment, as illustrated in Figs. 16G1 to 16G6, a fluidic material 1614 is then injected into the setting tool assembly 32 and the packer assembly 36

through the longitudinal passages 1402a, 1404b, 1406b, 1408b, 1504b, 1550a, and 1546b of the tubular adaptor 1402, tubular upper mandrel 1404, tubular mandrel 1406, tubular stinger 1408, tubular upper mandrel 1504, tubular sliding sleeve valve 1550, and tubular lower mandrel 1546, respectively. Because, the plug 1606 is seated within and blocks the longitudinal passage 1564a of the tubular plug seat 1564, the longitudinal passages 1504b, 1550a, and 1546b of the tubular upper mandrel 1504, tubular sliding sleeve valve 1550, and tubular lower mandrel 1546 are pressurized thereby displacing the tubular upper adaptor 1502 and tubular upper mandrel 1504 downwardly until the end face of the tubular upper mandrel impacts the end face of the upper tubular spacer ring 1506.

[0217] In an exemplary embodiment, as illustrated in Figs. 16H1 to 16H5, the setting tool assembly 32 is brought back into engagement with the packer assembly 36 until the engagement shoulder 1408e of the other end of the tubular stinger 1408 engages the collet fingers 1550d of the end of the tubular sliding sleeve valve 1550. As a result, further downward displacement of the tubular stinger 1408 displaces the tubular sliding sleeve valve 1550 downwardly until the radial flow ports, 1550b and 1550c, of the tubular sliding sleeve valve are aligned with the flow ports, 1546e and 1546f, of the tubular lower mandrel 1546. A hardenable fluidic sealing material 1616 may then be injected into the setting tool assembly 32 and the packer assembly 36 through the longitudinal passages 1402a, 1404b, 1406b, 1408b, and 1550a of the tubular adaptor 1402, tubular upper mandrel 1404, tubular mandrel 1406, tubular stinger 1408, and tubular sliding sleeve valve 1550, respectively. The hardenable fluidic sealing material may then flow out of the packer assembly 36 through the upper flow ports, 1558d and 1558e, into the annulus between the expandable wellbore casing 100 and the wellbore 102.

[0218] The tubular sliding sleeve valve 1550 may then be returned to its original position, with the radial flow ports, 1550b and 1550c, of the tubular sliding sleeve valve out of alignment with the flow ports, 1546e and 1546f, of the tubular lower mandrel 1546. The hardenable fluidic sealing material 1616 may then be allowed to cure before, during, or after the continued operation of the system 10 to further radially expand and plastically deform the expandable wellbore casing.

[0219] In an exemplary embodiment, the system 10 is provided as illustrated in Appendix A to the present application. Figs. 1-10, 11, 11a, 11b, 11c, 11d, 11e, 11f, 11g, 11h, 11k, 11l, 12a, 12b, 12c, 13a, 13b, 14, 15, 16a, 16b, 16c, 16d, 16e, 16f, 16g, and 16h of appendix A generally correspond to Figs. 1-10, 11-1 to 11-2, 11A1 to 11A2, 11B1 to 11B2, 11C, 11D, 11E, 11F, 11G, 11H, 11I, 11J, 11K, 11L, 12A1 to 12A4, 12B, 12C1 to 12C4, 13A1 to 13A8, 13B1 to 13B7, 14A to 14C, 15-1 to 15-5, 16A1 to 16A5, 16B1 to 16B5, 16C1 to 16C5, 16D1 to 16D5, 16E1 to 16E6, 16F1 to 16F6, 16G1 to 16G6, and 16H1 to 16H5, respectively.

[0220] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member, a cutting device for cutting the tubular member coupled to the support member, and an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member. In an exemplary embodiment, the apparatus further includes a gripping device for gripping the tubular member coupled to the support member. In an exemplary embodiment, the gripping device comprises a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member. In an exemplary embodiment, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and

[0221] wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the apparatus further includes a sealing device for sealing an interface with the tubular member coupled to the support member. In an exemplary embodiment, the sealing device seals an annulus defines between the support member and the tubular member. In an exemplary embodiment, the apparatus further includes a locking device for locking the position of the tubular member relative to the support member. In an exemplary embodiment, the apparatus further includes a packer assembly coupled to the support member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes: a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member. In an exemplary embodiment, the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device includes: a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the apparatus further includes an actuator for displacing the expansion device relative to the support member. In an exemplary embodiment, the actuator includes a first actuator for pulling the expansion device; and a second actuator for pushing the expansion device. In an exemplary embodiment, the actuator includes means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the first and second actuators include means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the actuator includes a plurality of pistons positioned within corresponding piston chambers. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of

the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements includes a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, the expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices includes an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the

internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0222] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member, an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member, and an actuator coupled to the support member for displacing the expansion device relative to the support member. In an exemplary embodiment, the apparatus further includes a cutting device coupled to the support member for cutting the tubular member. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, the apparatus further includes a gripping device for gripping the tubular member coupled to the support member. In an exemplary embodiment, the gripping device includes a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements

do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member. In an exemplary embodiment, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the apparatus further includes a sealing device for sealing an interface with the tubular member coupled to the support member. In an exemplary embodiment, the sealing device seals an annulus defines between the support member and the tubular member. In an exemplary embodiment, the apparatus further includes a locking device for locking the position of the tubular member relative to the support member. In an exemplary embodiment, the apparatus further includes a packer assembly coupled to the support member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member. In an exemplary embodiment, the packer control

device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device comprises: a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, the in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices includes an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the

internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0223] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member; an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a sealing assembly for sealing an annulus defined between the support member and the tubular member. In an exemplary embodiment, the apparatus further includes a gripping device for gripping the tubular member coupled to the support member. In an exemplary embodiment, the gripping device includes a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member. In an exemplary embodiment, the if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the the gripping elements are moveable from a first

position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the apparatus further includes a locking device for locking the position of the tubular member relative to the support member. In an exemplary embodiment, the apparatus further includes a packer assembly coupled to the support member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member. In an exemplary embodiment, the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the apparatus further includes an actuator for displacing the expansion device relative to the support member. In an exemplary embodiment, the actuator includes a first actuator for pulling the expansion device; and a second actuator for pushing the expansion device. In an exemplary embodiment, the actuator includes means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the actuator includes a plurality of pistons positioned within corresponding piston chambers. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position;

wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, the expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements includes a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices includes an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the

tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0224] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member; a first expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a second expansion device for radially expanding and plastically deforming the tubular member coupled to the support member. In an exemplary embodiment, the apparatus further includes a gripping device for gripping the tubular member coupled to the support member. In an exemplary embodiment, the gripping device includes a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction

relative to the support member. In an exemplary embodiment, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the apparatus further includes a sealing device for sealing an interface with the tubular member coupled to the support member. In an exemplary embodiment, the sealing device seals an annulus defines between the support member and the tubular member. In an exemplary embodiment, the apparatus further includes a locking device for locking the position of the tubular member relative to the support member. In an exemplary embodiment, the apparatus further includes a packer assembly coupled to the support member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member. In an exemplary embodiment, the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device comprises: a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the apparatus further includes an actuator for displacing the expansion device relative to the support member. In an exemplary embodiment, the actuator includes a first actuator for pulling the expansion device; and a second actuator for pushing the expansion device. In an exemplary embodiment, the actuator includes means for transferring torsional loads between the support member and

the expansion device. In an exemplary embodiment, the first and second actuators include means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the actuator includes a plurality of pistons positioned within corresponding piston chambers. In an exemplary embodiment, the apparatus further includes a cutting device for cutting the tubular member coupled to the support member. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, at least one of the first second expansion devices include a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary

embodiment, at least one of the first and second expansion devices comprise a plurality of expansion devices. In an exemplary embodiment, at least one of the first and second expansion device comprise an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0225] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member; an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and a packer coupled to the support member. In an exemplary embodiment, the apparatus further includes a gripping device for gripping the tubular member coupled to the support member. In an exemplary embodiment, the gripping device comprises a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position,

the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member. In an exemplary embodiment, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the apparatus further includes a sealing device for sealing an interface with the tubular member coupled to the support member. In an exemplary embodiment, the sealing device seals an annulus defines between the support member and the tubular member. In an exemplary embodiment, the apparatus further includes a locking device for locking the position of the tubular member relative to the support member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member. In an exemplary embodiment, the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger

coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the apparatus further includes an actuator for displacing the expansion device relative to the support member. In an exemplary embodiment, the actuator includes a first actuator for pulling the expansion device; and a second actuator for pushing the expansion device. In an exemplary embodiment, the actuator includes means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the first and second actuators include means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the actuator includes a plurality of pistons positioned within corresponding piston chambers. In an exemplary embodiment, the apparatus further includes a cutting device coupled to the support member for cutting the tubular member. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, the expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a

second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices comprises an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device includes a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0226] An apparatus for radially expanding and plastically deforming an expandable tubular member has been described that includes a support member; a cutting device for cutting the tubular member coupled to the support member; a gripping device for gripping the tubular member coupled to the support member; a sealing device for sealing an interface with the tubular member coupled to the support member; a locking device for locking the position of the tubular member relative to the support member; a first adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; a second adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; a packer coupled to the support member; and an actuator for displacing one or more of the sealing assembly, first and second adjustable expansion devices, and packer relative to the support member. In an exemplary embodiment, the gripping device includes a plurality of movable gripping

elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member. In an exemplary embodiment, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position. In an exemplary embodiment, the gripping device further includes an actuator for moving the gripping elements from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein the actuator is a fluid powered actuator. In an exemplary embodiment, the sealing device seals an annulus defines between the support member and the tubular member. In an exemplary embodiment, the packer assembly includes a packer; and a packer control device for controlling the operation of the packer coupled to the support member. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably

positioned within the passage of the support member. In an exemplary embodiment, the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the packer. In an exemplary embodiment, the packer includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve positioned within the passage of the support member; and wherein the packer control device includes a support member; one or more drag blocks releasably coupled to the support member; and a stinger coupled to the support member for engaging the sliding sleeve valve. In an exemplary embodiment, the actuator includes a first actuator for pulling the expansion device; and a second actuator for pushing the expansion device. In an exemplary embodiment, the actuator includes means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the first and second actuators include means for transferring torsional loads between the support member and the expansion device. In an exemplary embodiment, the actuator includes a plurality of pistons positioned within corresponding piston chambers. In an exemplary embodiment, the cutting device includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements. In an exemplary embodiment, at least one of the adjustable expansion devices include a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the

tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements. In an exemplary embodiment, at least one of the adjustable expansion devices comprise a plurality of expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices include a support member; and a plurality of movable expansion elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the expansion elements between a first position and a second position; wherein in the first position, the expansion elements do not engage the tubular member; and wherein in the second position, the expansion elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the expansion elements include a first set of expansion elements; and a second set of expansion elements; wherein the first set of expansion elements are interleaved with the second set of expansion elements. In an exemplary embodiment, in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements. In an exemplary embodiment, in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

[0227] An apparatus for cutting a tubular member has been described that includes a support member; and a plurality of movable cutting elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the cutting elements between a first position and a second position; wherein in the first position, the cutting elements do not engage the tubular member; and wherein in the second position, the cutting elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the cutting elements from being moved to the

second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the cutting elements include a first set of cutting elements; and a second set of cutting elements; wherein the first set of cutting elements are interleaved with the second set of cutting elements. In an exemplary embodiment, in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements. In an exemplary embodiment, in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

[0228] An apparatus for engaging a tubular member has been described that includes a support member; and a plurality of movable elements coupled to the support member. In an exemplary embodiment, the apparatus further includes an actuator coupled to the support member for moving the elements between a first position and a second position; wherein in the first position, the elements do not engage the tubular member; and wherein in the second position, the elements engage the tubular member. In an exemplary embodiment, the apparatus further includes a sensor coupled to the support member for sensing the internal diameter of the tubular member. In an exemplary embodiment, the sensor prevents the elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, the elements include a first set of elements; and a second set of elements; wherein the first set of elements are interleaved with the second set of elements. In an exemplary embodiment, in the first position, the first set of elements are not axially aligned with the second set of elements. In an exemplary embodiment, in the second position, the first set of elements are axially aligned with the second set of elements.

[0229] An apparatus for gripping a tubular member has been described that includes a plurality of movable gripping elements. In an exemplary embodiment, the gripping elements are moveable in a radial direction. In an exemplary embodiment, the gripping elements are moveable in an axial direction. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction. In an exemplary embodiment, the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second

position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction. In an exemplary embodiment, in a first axial direction, the gripping device grips the tubular member; and wherein, in a second axial direction, the gripping device does not grip the tubular member. In an exemplary embodiment, the apparatus further includes an actuator for moving the gripping elements. In an exemplary embodiment, the gripping elements include a plurality of separate and distinct gripping elements.

[0230] An actuator has been described that includes a tubular housing; a tubular piston rod movably coupled to and at least partially positioned within the housing; a plurality of annular piston chambers defined by the tubular housing and the tubular piston rod; and a plurality of tubular pistons coupled to the tubular piston rod, each tubular piston movably positioned within a corresponding annular piston chamber. In an exemplary embodiment, the actuator further includes means for transmitting torsional loads between the tubular housing and the tubular piston rod.

[0231] An apparatus for controlling a packer has been described that includes a tubular support member; one or more drag blocks releasably coupled to the tubular support member; and a tubular stinger coupled to the tubular support member for engaging the packer. In an exemplary embodiment, the apparatus further includes a tubular sleeve coupled to the drag blocks. In an exemplary embodiment, the tubular support member includes one or more axially aligned teeth for engaging the packer.

[0232] A packer has been described that includes a support member defining a passage; a shoe comprising a float valve coupled to an end of the support member; one or more compressible packer elements movably coupled to the support member; and a sliding sleeve valve movably positioned within the passage of the support member.

[0233] A method of radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing has been described that includes positioning the tubular member within the borehole in overlapping relation to the wellbore casing; radially expanding and plastically deforming a portion of the tubular member to form a bell section; and radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing; wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section. In an exemplary embodiment, radially expanding and plastically deforming a portion of the tubular member to form a bell section includes positioning an adjustable expansion device within the expandable tubular member; supporting the expandable tubular member and the adjustable expansion device within the borehole; lowering the adjustable expansion device out of the expandable tubular member;

increasing the outside dimension of the adjustable expansion device; and displacing the adjustable expansion device upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member, wherein n is greater than or equal to 1.

[0234] A method for forming a mono diameter wellbore casing has been described that includes positioning an adjustable expansion device within a first expandable tubular member; supporting the first expandable tubular member and the adjustable expansion device within a borehole; lowering the adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; positioning the adjustable expansion device within a second expandable tubular member; supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member; lowering the adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the adjustable expansion device; and displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

[0235] A method for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes positioning an adjustable expansion device within the expandable tubular member; supporting the expandable tubular member and the adjustable expansion device within the borehole; lowering the adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the adjustable expansion device; displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and pressurizing an interior region of the expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

[0236] A method for forming a mono diameter wellbore casing has been described that includes positioning an adjustable expansion device within a first expandable tubular member; supporting the first expandable tubular member and the adjustable expansion device within a borehole; lowering the adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first

expandable tubular member within the borehole; pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole; positioning the adjustable expansion mandrel within a second expandable tubular member; supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member; lowering the adjustable expansion mandrel out of the second expandable tubular member; increasing the outside dimension of the adjustable expansion mandrel; displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

[0237] A method for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes positioning first and second adjustable expansion devices within the expandable tubular member; supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; lowering the first adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0238] A method for forming a mono diameter wellbore casing has been described that includes positioning first and second adjustable expansion devices within a first expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; lowering the first adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a

lower portion of the first expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; positioning first and second adjustable expansion devices within a second expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; lowering the first adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0239] A method for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes positioning first and second adjustable expansion devices within the expandable tubular member; supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; lowering the first adjustable expansion device out of the expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable

expansion device; displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0240] A method for forming a mono diameter wellbore casing has been described that includes positioning first and second adjustable expansion devices within a first expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; lowering the first adjustable expansion device out of the first expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device; positioning first and second adjustable expansion devices within a second expandable tubular member; supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; lowering the first adjustable expansion device out of the second expandable tubular member; increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial

expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device; displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0241] A method for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; increasing the size of the adjustable expansion device; and displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member. In an exemplary embodiment, the method further includes reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed. In an exemplary embodiment, the method further includes fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device. In an exemplary embodiment, the method further includes permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member. In an exemplary embodiment, the method further includes injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and a preexisting structure after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the method further includes increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the method further includes displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member. In

an exemplary embodiment, the method further includes if the end of the other portion of the expandable tubular member overlaps with a preexisting structure, then not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the other portion of the expandable tubular member that overlaps with the preexisting structure.

[0242] A method for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing has been described that includes supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; increasing the size of the adjustable expansion device; displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member; and displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member. In an exemplary embodiment, the method further includes reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed. In an exemplary embodiment, the method further includes fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device. In an exemplary embodiment, the method further includes permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member. In an exemplary embodiment, the method further includes injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the borehole after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the method further includes increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the method further includes displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member. In an exemplary embodiment, the method further includes not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and displacing the adjustable expansion cone upwardly relative to the expandable tubular

member using the hydraulic actuator to radially expand and plastically deform the end of the remaining portion of the expandable tubular member that overlaps with the preexisting wellbore casing after not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

[0243] A method of radially expanding and plastically deforming a tubular member has been described that includes positioning the tubular member within a preexisting structure; radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and radially expanding and plastically deforming a portion of the tubular member above the bell section. In an exemplary embodiment, positioning the tubular member within a preexisting structure includes locking the tubular member to an expansion device. In an exemplary embodiment, the outside diameter of the expansion device is less than the inside diameter of the tubular member. In an exemplary embodiment, the expansion device is positioned within the tubular member. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices includes an adjustable expansion device. In an exemplary embodiment, at least one of the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, radially expanding and plastically deforming a lower portion of the tubular member to form a bell section includes lowering an expansion device out of an end of the tubular member; and pulling the expansion device through the end of the tubular member. In an exemplary embodiment, lowering an expansion device out of an end of the tubular member includes lowering the expansion device out of the end of the tubular member; and adjusting the size of the expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes gripping the tubular member; and pulling an expansion device through an end of the tubular member. In an exemplary embodiment, gripping the tubular member includes permitting axial displacement of the tubular member in a first direction; and not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, radially expanding and plastically deforming a portion of the tubular member above the bell section includes lowering an expansion device out of an end of the tubular

member; and pulling the expansion device through the end of the tubular member. In an exemplary embodiment, lowering an expansion device out of an end of the tubular member includes lowering the expansion device out of the end of the tubular member; and adjusting the size of the expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes gripping the tubular member; and pulling an expansion device through an end of the tubular member. In an exemplary embodiment, gripping the tubular member includes permitting axial displacement of the tubular member in a first direction; and not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes pulling the expansion device through the end of the tubular member using fluid pressure. In an exemplary embodiment, pulling the expansion device through the end of the tubular member using fluid pressure includes pressurizing an annulus within the tubular member above the expansion device. In an exemplary embodiment, radially expanding and plastically deforming a portion of the tubular member above the bell section includes fluidicly sealing an end of the tubular member; and pulling the expansion device through the tubular member. In an exemplary embodiment, the expansion device is adjustable. In an exemplary embodiment, the expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device comprises a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes gripping the tubular member; and pulling an expansion device through an end of the tubular member. In an exemplary embodiment, gripping the tubular member includes permitting axial displacement of the tubular member in a first direction; and not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, pulling the expansion device through the end of the tubular member includes pulling the expansion device through the end of the tubular member using fluid pressure. In an exemplary embodiment, pulling the expansion device through the end of the tubular member using fluid pressure includes pressurizing an annulus within the tubular member above the expansion device. In an

exemplary embodiment, radially expanding and plastically deforming a portion of the tubular member above the bell section includes overlapping the portion of the tubular member above the bell section with an end of a preexisting tubular member; and pulling an expansion device through the overlapping portions of the tubular member and the preexisting tubular member. In an exemplary embodiment, the expansion device is adjustable. In an exemplary embodiment, the expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes gripping the tubular member; and pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member. In an exemplary embodiment, gripping the tubular member includes permitting axial displacement of the tubular member in a first direction; and not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using an actuator. In an exemplary embodiment, pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure. In an exemplary embodiment, pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure includes pressurizing an annulus within the tubular member above the expansion device. In an exemplary embodiment, the method further includes cutting an end of the portion of the tubular member that overlaps with the preexisting tubular member. In an exemplary embodiment, the method further includes removing the cut off end of the expandable tubular member from the preexisting structure. In an exemplary embodiment, the method further includes injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the preexisting structure. In an exemplary embodiment, the method further includes cutting off an end of the expandable tubular member. In an exemplary embodiment, the method further includes removing the cut off end of the expandable tubular member from the preexisting structure.

[0244] A method of radially expanding and plastically deforming a tubular member has been described that includes applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another.

[0245] A system for radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing has been described that includes means for positioning the tubular member within the borehole in overlapping relation to the wellbore casing; means for radially expanding and plastically deforming a portion of the tubular member to form a bell section; and means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing; wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section. In an exemplary embodiment, means for radially expanding and plastically deforming a portion of the tubular member to form a bell section includes means for positioning an adjustable expansion device within the expandable tubular member; means for supporting the expandable tubular member and the adjustable expansion device within the borehole; means for lowering the adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; and means for displacing the adjustable expansion device upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member, wherein n is greater than or equal to 1.

[0246] A system for forming a mono diameter wellbore casing has been described that includes means for positioning an adjustable expansion device within a first expandable tubular member; means for supporting the first expandable tubular member and the adjustable expansion device within a borehole; means for lowering the adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; means for positioning the adjustable expansion device within a second expandable tubular member; means for supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member; means for lowering the adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; and means for displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

[0247] A system for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes means for positioning an adjustable expansion device within the expandable tubular member; means for supporting

the expandable tubular member and the adjustable expansion device within the borehole; means for lowering the adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and means for pressurizing an interior region of the expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

[0248] A system for forming a mono diameter wellbore casing has been described that includes means for positioning an adjustable expansion device within a first expandable tubular member; means for supporting the first expandable tubular member and the adjustable expansion device within a borehole; means for lowering the adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole; means for pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole; means for positioning the adjustable expansion mandrel within a second expandable tubular member; means for supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member; means for lowering the adjustable expansion mandrel out of the second expandable tubular member; means for increasing the outside dimension of the adjustable expansion mandrel; means for displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and means for pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

[0249] A system for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes means for positioning first and second adjustable expansion devices within the expandable tubular member; means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; means for lowering the first adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device

upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0250] A system for forming a mono diameter wellbore casing has been described that includes means for positioning first and second adjustable expansion devices within a first expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; means for lowering the first adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; means for positioning first and second adjustable expansion devices within a second expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; means for lowering the first adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and means for displacing the second

adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0251] A system for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes means for positioning first and second adjustable expansion devices within the expandable tubular member; means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole; means for lowering the first adjustable expansion device out of the expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member; means for pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and means for pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0252] A system for forming a mono diameter wellbore casing has been described that includes means for positioning first and second adjustable expansion devices within a first expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole; means for lowering the first adjustable expansion device out of the first expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first

expandable tubular member; means for pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member; means for pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device; means for positioning first and second adjustable expansion devices within a second expandable tubular member; means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member; means for lowering the first adjustable expansion device out of the second expandable tubular member; means for increasing the outside dimension of the first adjustable expansion device; means for displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member; means for pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device; means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member; means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; means for displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and means for pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device; wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

[0253] A system for radially expanding and plastically deforming an expandable tubular member within a borehole has been described that includes means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; means for increasing the size of the adjustable expansion device; and means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member. In an exemplary embodiment, the system further includes means for reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed. In an exemplary embodiment, the system further includes means for fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device. In an exemplary embodiment, the system further includes means for permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member. In an exemplary embodiment, the system further includes means for injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and a preexisting structure after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the system further includes means for increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, system further includes means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member. In an exemplary embodiment, the system further includes if the end of the other portion of the expandable tubular member overlaps with a preexisting structure, then means for not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the other portion of the expandable tubular member that overlaps with the preexisting structure.

[0254] A system for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing has been described that includes means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole; means for increasing the size of the adjustable expansion device; means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and

plastically deform a portion of the expandable tubular member; and means for displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member. In an exemplary embodiment, the system further includes means for reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed. In an exemplary embodiment, the system further includes means for fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device. In an exemplary embodiment, the system further includes means for permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member. In an exemplary embodiment, the system further includes means for injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the borehole after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the system further includes means for increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator. In an exemplary embodiment, the system further includes means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member. In an exemplary embodiment, the system further includes means for not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the remaining portion of the expandable tubular member that overlaps with the preexisting wellbore casing after not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

[0255] A system for radially expanding and plastically deforming a tubular member has been described that includes means for positioning the tubular member within a preexisting structure; means for radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and means for radially expanding and plastically deforming a portion of the tubular member above the bell section. In an exemplary embodiment, positioning the tubular member within a preexisting structure includes means for locking the tubular member to an expansion device. In an exemplary embodiment, the outside diameter of the expansion device is less than the inside diameter of the tubular

member. In an exemplary embodiment, the expansion device is positioned within the tubular member. In an exemplary embodiment, the expansion device includes an adjustable expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of expansion devices. In an exemplary embodiment, at least one of the expansion devices includes an adjustable expansion device. In an exemplary embodiment, at least one of the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, means for radially expanding and plastically deforming a lower portion of the tubular member to form a bell section includes means for lowering an expansion device out of an end of the tubular member; and means for pulling the expansion device through the end of the tubular member. In an exemplary embodiment, means for lowering an expansion device out of an end of the tubular member includes means for lowering the expansion device out of the end of the tubular member; and means for adjusting the size of the expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for gripping the tubular member; and means for pulling an expansion device through an end of the tubular member. In an exemplary embodiment, means for gripping the tubular member includes means for permitting axial displacement of the tubular member in a first direction; and means for not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, means for radially expanding and plastically deforming a portion of the tubular member above the bell section includes means for lowering an expansion device out of an end of the tubular member; and means for pulling the expansion device through the end of the tubular member. In an exemplary embodiment, means for lowering an expansion device out of an end of the tubular member includes means for lowering the expansion device out of the end of the tubular member; and means for adjusting the size of the expansion device. In an exemplary embodiment, the adjustable expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device comprises a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for gripping the tubular member; and means for

pulling an expansion device through an end of the tubular member. In an exemplary embodiment, means for gripping the tubular member includes means for permitting axial displacement of the tubular member in a first direction; and means for not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for pulling the expansion device through the end of the tubular member using fluid pressure. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member using fluid pressure includes means for pressurizing an annulus within the tubular member above the expansion device. In an exemplary embodiment, means for radially expanding and plastically deforming a portion of the tubular member above the bell section includes means for fluidicly sealing an end of the tubular member; and means for pulling the expansion device through the tubular member. In an exemplary embodiment, the expansion device is adjustable. In an exemplary embodiment, the expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for gripping the tubular member; and means for pulling an expansion device through an end of the tubular member. In an exemplary embodiment, means for gripping the tubular member includes means for permitting axial displacement of the tubular member in a first direction; and means for not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for pulling the expansion device through the end of the tubular member using an actuator. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member includes means for pulling the expansion device through the end of the tubular member using fluid pressure. In an exemplary embodiment, means for pulling the expansion device through the end of the tubular member using fluid pressure includes means for pressurizing an annulus within the tubular member above the expansion device. In an exemplary embodiment, means for radially expanding and plastically deforming a portion of the tubular member above the bell section includes means for overlapping the portion of the tubular member above the bell section with an end of a preexisting tubular member; and means for pulling an expansion device through the overlapping portions of the tubular member and the preexisting tubular member. In an exemplary embodiment, the expansion device is adjustable. In an

exemplary embodiment, the expansion device is adjustable to a plurality of sizes. In an exemplary embodiment, the expansion device includes a plurality of adjustable expansion devices. In an exemplary embodiment, at least one of the adjustable expansion devices is adjustable to a plurality of sizes. In an exemplary embodiment, means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes means for gripping the tubular member; and means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member. In an exemplary embodiment, means for gripping the tubular member includes means for permitting axial displacement of the tubular member in a first direction; and means for not permitting axial displacement of the tubular member in a second direction. In an exemplary embodiment, means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using an actuator. In an exemplary embodiment, means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member includes means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure. In an exemplary embodiment, means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure includes means for pressurizing an annulus within the tubular member above the expansion device. In an exemplary embodiment, the system further includes means for cutting an end of the portion of the tubular member that overlaps with the preexisting tubular member. In an exemplary embodiment, the system further includes means for removing the cut off end of the expandable tubular member from the preexisting structure. In an exemplary embodiment, the system further includes means for injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the preexisting structure. In an exemplary embodiment, the system further includes means for cutting off an end of the expandable tubular member. In an exemplary embodiment, the system further includes means for removing the cut off end of the expandable tubular member from the preexisting structure.

[0256] A system of radially expanding and plastically deforming a tubular member has been described that includes a support member; and means for applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another coupled to the support member.

[0257] A method of cutting a tubular member has been described that includes positioning a plurality of cutting elements within the tubular member; and bringing the cutting elements into engagement with the tubular member. In an exemplary embodiment, the

cutting elements include a first group of cutting elements; and a second group of cutting elements; wherein the first group of cutting elements are interleaved with the second group of cutting elements. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member includes bringing the cutting elements into axial alignment. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member further includes pivoting the cutting elements. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member further includes translating the cutting elements. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member further includes pivoting the cutting elements; and translating the cutting elements. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member includes rotating the cutting elements about a common axis. In an exemplary embodiment, bringing the cutting elements into engagement with the tubular member includes pivoting the cutting elements about corresponding axes; translating the cutting elements; and rotating the cutting elements about a common axis. In an exemplary embodiment, the method further includes preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value includes sensing the inside diameter of the tubular member.

[0258] A method of gripping a tubular member has been described that includes positioning a plurality of gripping elements within the tubular member; bringing the gripping elements into engagement with the tubular member. In an exemplary embodiment, bringing the gripping elements into engagement with the tubular member includes displacing the gripping elements in an axial direction; and displacing the gripping elements in a radial direction. In an exemplary embodiment, the method further includes biasing the gripping elements against engagement with the tubular member.

[0259] A method of operating an actuator has been described that includes pressurizing a plurality of pressure chamber. In an exemplary embodiment, the method further includes transmitting torsional loads.

[0260] A method of injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure has been described that includes positioning the tubular member into the preexisting structure; sealing off an end of the tubular member; operating a valve within the end of the tubular member; and injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

[0261] A system for cutting a tubular member has been described that includes means for positioning a plurality of cutting elements within the tubular member; and means for bringing the cutting elements into engagement with the tubular member. In an exemplary embodiment, the cutting elements include a first group of cutting elements; and a second group of cutting elements; wherein the first group of cutting elements are interleaved with the second group of cutting elements. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member includes means for bringing the cutting elements into axial alignment. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member further includes means for pivoting the cutting elements. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member further includes means for translating the cutting elements. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member further includes means for pivoting the cutting elements; and means for translating the cutting elements. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member includes means for rotating the cutting elements about a common axis. In an exemplary embodiment, means for bringing the cutting elements into engagement with the tubular member includes means for pivoting the cutting elements about corresponding axes; means for translating the cutting elements; and means for rotating the cutting elements about a common axis. In an exemplary embodiment, the system further includes means for preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, means for preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value includes means for sensing the inside diameter of the tubular member.

[0262] A system for gripping a tubular member has been described that includes means for positioning a plurality of gripping elements within the tubular member; and means for bringing the gripping elements into engagement with the tubular member. In an exemplary embodiment, means for bringing the gripping elements into engagement with the tubular member includes means for displacing the gripping elements in an axial direction; and means for displacing the gripping elements in a radial direction. In an exemplary embodiment, the system further includes means for biasing the gripping elements against engagement with the tubular member.

[0263] An actuator system has been described that includes a support member; and means for pressurizing a plurality of pressure chambers coupled to the support member. In an exemplary embodiment, the system further includes means for transmitting torsional loads.

[0264] A system for injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure has been described that includes means for positioning the tubular member into the preexisting structure; means for sealing off an end of the tubular member; means for operating a valve within the end of the tubular member; and means for injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

[0265] A method of engaging a tubular member has been described that includes positioning a plurality of elements within the tubular member; and bringing the elements into engagement with the tubular member. In an exemplary embodiment, the elements include a first group of elements; and a second group of elements; wherein the first group of elements are interleaved with the second group of elements. In an exemplary embodiment, bringing the elements into engagement with the tubular member includes bringing the elements into axial alignment. In an exemplary embodiment, bringing the elements into engagement with the tubular member further includes pivoting the elements. In an exemplary embodiment, bringing the elements into engagement with the tubular member further includes translating the elements. In an exemplary embodiment, bringing the elements into engagement with the tubular member further includes pivoting the elements; and translating the elements. In an exemplary embodiment, bringing the elements into engagement with the tubular member includes rotating the elements about a common axis. In an exemplary embodiment, bringing the elements into engagement with the tubular member includes pivoting the elements about corresponding axes; translating the elements; and rotating the elements about a common axis. In an exemplary embodiment, the method further includes preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value includes sensing the inside diameter of the tubular member.

[0266] A system for engaging a tubular member has been described that includes means for positioning a plurality of elements within the tubular member; and means for bringing the elements into engagement with the tubular member. In an exemplary embodiment, the elements include a first group of elements; and a second group of elements; wherein the first group of elements are interleaved with the second group of elements. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member includes means for bringing the elements into axial alignment. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member further includes means for pivoting the elements. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member

further includes means for translating the elements. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member further includes means for pivoting the elements; and means for translating the elements. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member includes means for rotating the elements about a common axis. In an exemplary embodiment, means for bringing the elements into engagement with the tubular member includes means for pivoting the elements about corresponding axes; means for translating the elements; and means for rotating the elements about a common axis. In an exemplary embodiment, the system further includes means for preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value. In an exemplary embodiment, means for preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value includes means for sensing the inside diameter of the tubular member.

[0267] It is understood that variations may be made in the foregoing without departing from the scope of the invention. For example, the teachings of the present illustrative embodiments may be used to provide a wellbore casing, a pipeline, or a structural support. Furthermore, the elements and teachings of the various illustrative embodiments may be combined in whole or in part in some or all of the illustrative embodiments.

[0268] Although illustrative embodiments of the invention have been shown and described, a wide range of modification, changes and substitution is contemplated in the foregoing disclosure. In some instances, some features of the present invention may be employed without a corresponding use of the other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.

Claims

What is claimed is:

1. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:

a support member;

a cutting device for cutting the tubular member coupled to the support member; and

an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member.

2. The apparatus of claim 1, further comprising:

a gripping device for gripping the tubular member coupled to the support member.

3. The apparatus of claim 2, wherein the gripping device comprises a plurality of movable gripping elements.

4. The apparatus of claim 3, wherein the gripping elements are moveable in a radial direction relative to the support member.

5. The apparatus of claim 3, wherein the gripping elements are moveable in an axial direction relative to the support member.

6. The apparatus of claim 3, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

7. The apparatus of claim 3, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

8. The apparatus of claim 3, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member.

9. The apparatus of claim 3, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

10. The apparatus of claim 3, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

11. The apparatus of claim 3, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

12. The apparatus of claim 3, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

13. The apparatus of claim 1, further comprising:

a sealing device for sealing an interface with the tubular member coupled to the support member.

14. The apparatus of claim 13, wherein the sealing device seals an annulus defines between the support member and the tubular member.

15. The apparatus of claim 1, further comprising:

a locking device for locking the position of the tubular member relative to the support member.

16. The apparatus of claim 1, further comprising:

a packer assembly coupled to the support member.

17. The apparatus of claim 16, wherein the packer assembly comprises:

a packer; and

a packer control device for controlling the operation of the packer coupled to the support member.

18. The apparatus of claim 17, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve movably positioned within the passage of the support member.

19. The apparatus of claim 17, wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the packer.

20. The apparatus of claim 17, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve positioned within the passage of the support member; and

wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the sliding sleeve valve.

21. The apparatus of claim 1, further comprising:
an actuator for displacing the expansion device relative to the support member.

22. The apparatus of claim 21, wherein the actuator comprises:
a first actuator for pulling the expansion device; and
a second actuator for pushing the expansion device.

23. The apparatus of claim 21, wherein the actuator comprises means for transferring torsional loads between the support member and the expansion device.

24. The apparatus of claim 22, wherein the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device.

25. The apparatus of claim 21, wherein the actuator comprises a plurality of pistons positioned within corresponding piston chambers.

26. The apparatus of claim 1, wherein the cutting device comprises:
a support member; and
a plurality of movable cutting elements coupled to the support member.

27. The apparatus of claim 26, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

28. The apparatus of claim 27, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

29. The apparatus of claim 28, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

30. The apparatus of claim 27, wherein the cutting elements comprise:
a first set of cutting elements; and

a second set of cutting elements;

wherein the first set of cutting elements are interleaved with the second set of cutting elements.

31. The apparatus of claim 30, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

32. The apparatus of claim 30, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

33. The apparatus of claim 1, wherein the expansion device comprises:

a support member; and

a plurality of movable expansion elements coupled to the support member.

34. The apparatus of claim 33, further comprising:

an actuator coupled to the support member for moving the expansion elements between a first position and a second position;

wherein in the first position, the expansion elements do not engage the tubular member; and

wherein in the second position, the expansion elements engage the tubular member.

35. The apparatus of claim 34, further comprising:

a sensor coupled to the support member for sensing the internal diameter of the tubular member.

36. The apparatus of claim 35, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

37. The apparatus of claim 34, wherein the expansion elements comprise:

a first set of expansion elements; and

a second set of expansion elements;

wherein the first set of expansion elements are interleaved with the second set of expansion elements.

38. The apparatus of claim 37, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

39. The apparatus of claim 37, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

40. The apparatus of claim 1, wherein the expansion device comprises an adjustable expansion device.

41. The apparatus of claim 1, wherein the expansion device comprises a plurality of expansion devices.

42. The apparatus of claim 41, wherein at least one of the expansion devices comprises an adjustable expansion device.

43. The apparatus of claim 42, wherein the adjustable expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

44. The apparatus of claim 43, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

45. The apparatus of claim 44, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

46. The apparatus of claim 45, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

47. The apparatus of claim 44, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

48. The apparatus of claim 47, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

49. The apparatus of claim 47, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

50. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:

a support member;

an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and

an actuator coupled to the support member for displacing the expansion device relative to the support member.

51. The apparatus of claim 50, further comprising:

a cutting device coupled to the support member for cutting the tubular member.

52. The apparatus of claim 51, wherein the cutting device comprises:

a support member; and

a plurality of movable cutting elements coupled to the support member.

53. The apparatus of claim 52, further comprising:

an actuator coupled to the support member for moving the cutting elements between a first position and a second position;

wherein in the first position, the cutting elements do not engage the tubular member; and

wherein in the second position, the cutting elements engage the tubular member.

54. The apparatus of claim 53, further comprising:

a sensor coupled to the support member for sensing the internal diameter of the tubular member.

55. The apparatus of claim 54, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

56. The apparatus of claim 53, wherein the cutting elements comprise:
a first set of cutting elements; and
a second set of cutting elements;
wherein the first set of cutting elements are interleaved with the second set of cutting elements.

57. The apparatus of claim 56, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

58. The apparatus of claim 56, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

59. The apparatus of claim 50, further comprising:
a gripping device for gripping the tubular member coupled to the support member.

60. The apparatus of claim 59, wherein the gripping device comprises a plurality of movable gripping elements.

61. The apparatus of claim 60, wherein the gripping elements are moveable in a radial direction relative to the support member.

62. The apparatus of claim 60, wherein the gripping elements are moveable in an axial direction relative to the support member.

63. The apparatus of claim 60, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

64. The apparatus of claim 60, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

65. The apparatus of claim 60, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do

engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member.

66. The apparatus of claim 60, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

67. The apparatus of claim 50, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

68. The apparatus of claim 60, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

69. The apparatus of claim 60, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

70. The apparatus of claim 50, further comprising:

a sealing device for sealing an interface with the tubular member coupled to the support member.

71. The apparatus of claim 70, wherein the sealing device seals an annulus defines between the support member and the tubular member.

72. The apparatus of claim 50, further comprising:

a locking device for locking the position of the tubular member relative to the support member.

73. The apparatus of claim 50, further comprising:

a packer assembly coupled to the support member.

74. The apparatus of claim 73, wherein the packer assembly comprises:

a packer; and

a packer control device for controlling the operation of the packer coupled to the support member.

75. The apparatus of claim 74, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve movably positioned within the passage of the support member.

76. The apparatus of claim 74, wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the packer.

77. The apparatus of claim 74, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve positioned within the passage of the support member; and

wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the sliding sleeve valve.

78. The apparatus of claim 50, wherein the expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

79. The apparatus of claim 78, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

80. The apparatus of claim 79, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

81. The apparatus of claim 80, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

82. The apparatus of claim 79, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

83. The apparatus of claim 82, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

84. The apparatus of claim 82, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

85. The apparatus of claim 50, wherein the expansion device comprises an adjustable expansion device.

86. The apparatus of claim 50, wherein the expansion device comprises a plurality of expansion devices.

87. The apparatus of claim 86, wherein at least one of the expansion devices comprises an adjustable expansion device.

88. The apparatus of claim 87, wherein the adjustable expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

89. The apparatus of claim 88, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

90. The apparatus of claim 89, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

91. The apparatus of claim 90, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

92. The apparatus of claim 89, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

93. The apparatus of claim 92, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

94. The apparatus of claim 92, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

95. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:

a support member;

an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and

a sealing assembly for sealing an annulus defined between the support member and the tubular member.

96. The apparatus of claim 95, further comprising:

a gripping device for gripping the tubular member coupled to the support member.

97. The apparatus of claim 96, wherein the gripping device comprises a plurality of movable gripping elements.

98. The apparatus of claim 97, wherein the gripping elements are moveable in a radial direction relative to the support member.

99. The apparatus of claim 97, wherein the gripping elements are moveable in an axial direction relative to the support member.

100. The apparatus of claim 97, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

101. The apparatus of claim 97, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

102. The apparatus of claim 97, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member.

103. The apparatus of claim 97, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not

engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

104. The apparatus of claim 97, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

105. The apparatus of claim 97, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

106. The apparatus of claim 97, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

107. The apparatus of claim 95, further comprising:

a locking device for locking the position of the tubular member relative to the support member.

108. The apparatus of claim 95, further comprising:

a packer assembly coupled to the support member.

109. The apparatus of claim 108, wherein the packer assembly comprises:

a packer; and

a packer control device for controlling the operation of the packer coupled to the support member.

110. The apparatus of claim 109, wherein the packer comprises:
a support member defining a passage;
a shoe comprising a float valve coupled to an end of the support member;
one or more compressible packer elements movably coupled to the support member; and
a sliding sleeve valve movably positioned within the passage of the support member.

111. The apparatus of claim 109, wherein the packer control device comprises:
a support member;
one or more drag blocks releasably coupled to the support member; and
a stinger coupled to the support member for engaging the packer.

112. The apparatus of claim 109, wherein the packer comprises:
a support member defining a passage;
a shoe comprising a float valve coupled to an end of the support member;
one or more compressible packer elements movably coupled to the support member; and
a sliding sleeve valve positioned within the passage of the support member; and
wherein the packer control device comprises:
a support member;
one or more drag blocks releasably coupled to the support member; and
a stinger coupled to the support member for engaging the sliding sleeve valve.

113. The apparatus of claim 95, further comprising:
an actuator for displacing the expansion device relative to the support member.

114. The apparatus of claim 113, wherein the actuator comprises:
a first actuator for pulling the expansion device; and
a second actuator for pushing the expansion device.

115. The apparatus of claim 113, wherein the actuator comprises means for transferring torsional loads between the support member and the expansion device.

116. The apparatus of claim 114, wherein the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device.

117. The apparatus of claim 113, wherein the actuator comprises a plurality of pistons positioned within corresponding piston chambers.

118. The apparatus of claim 95, wherein the cutting device comprises:
a support member; and
a plurality of movable cutting elements coupled to the support member.

119. The apparatus of claim 118, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

120. The apparatus of claim 119, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

121. The apparatus of claim 120, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

122. The apparatus of claim 119, wherein the cutting elements comprise:
a first set of cutting elements; and
a second set of cutting elements;
wherein the first set of cutting elements are interleaved with the second set of cutting elements.

123. The apparatus of claim 122, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

124. The apparatus of claim 122, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

125. The apparatus of claim 95, wherein the expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

126. The apparatus of claim 125, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

127. The apparatus of claim 126, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

128. The apparatus of claim 127, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

129. The apparatus of claim 126, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

130. The apparatus of claim 129, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

131. The apparatus of claim 129, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

132. The apparatus of claim 95, wherein the expansion device comprises an adjustable expansion device.

133. The apparatus of claim 95, wherein the expansion device comprises a plurality of expansion devices.

134. The apparatus of claim 133, wherein at least one of the expansion devices comprises an adjustable expansion device.

135. The apparatus of claim 134, wherein the adjustable expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

136. The apparatus of claim 135, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

137. The apparatus of claim 136, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

138. The apparatus of claim 137, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

139. The apparatus of claim 136, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

140. The apparatus of claim 139, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

141. The apparatus of claim 139, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

142. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:
a support member;

a first expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and

a second expansion device for radially expanding and plastically deforming the tubular member coupled to the support member.

143. The apparatus of claim 142, further comprising:
a gripping device for gripping the tubular member coupled to the support member.

144. The apparatus of claim 143, wherein the gripping device comprises a plurality of movable gripping elements.

145. The apparatus of claim 144, wherein the gripping elements are moveable in a radial direction relative to the support member.

146. The apparatus of claim 144, wherein the gripping elements are moveable in an axial direction relative to the support member.

147. The apparatus of claim 144, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

148. The apparatus of claim 144, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

149. The apparatus of claim 144, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member.

150. The apparatus of claim 144, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do

engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

151. The apparatus of claim 144, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

152. The apparatus of claim 144, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

153. The apparatus of claim 144, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

154. The apparatus of claim 142, further comprising:

a sealing device for sealing an interface with the tubular member coupled to the support member.

155. The apparatus of claim 154, wherein the sealing device seals an annulus defines between the support member and the tubular member.

156. The apparatus of claim 142, further comprising:

a locking device for locking the position of the tubular member relative to the support member.

157. The apparatus of claim 142, further comprising:

a packer assembly coupled to the support member.

158. The apparatus of claim 157, wherein the packer assembly comprises:
a packer; and
a packer control device for controlling the operation of the packer coupled to the support member.

159. The apparatus of claim 158, wherein the packer comprises:
a support member defining a passage;
a shoe comprising a float valve coupled to an end of the support member;
one or more compressible packer elements movably coupled to the support member; and
a sliding sleeve valve movably positioned within the passage of the support member.

160. The apparatus of claim 158, wherein the packer control device comprises:
a support member;
one or more drag blocks releasably coupled to the support member; and
a stinger coupled to the support member for engaging the packer.

161. The apparatus of claim 158, wherein the packer comprises:
a support member defining a passage;
a shoe comprising a float valve coupled to an end of the support member;
one or more compressible packer elements movably coupled to the support member; and
a sliding sleeve valve positioned within the passage of the support member; and
wherein the packer control device comprises:
a support member;
one or more drag blocks releasably coupled to the support member; and
a stinger coupled to the support member for engaging the sliding sleeve valve.

162. The apparatus of claim 142, further comprising:
an actuator for displacing the expansion device relative to the support member.

163. The apparatus of claim 162, wherein the actuator comprises:
a first actuator for pulling the expansion device; and
a second actuator for pushing the expansion device.

164. The apparatus of claim 162, wherein the actuator comprises means for transferring torsional loads between the support member and the expansion device.

165. The apparatus of claim 163, wherein the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device.

166. The apparatus of claim 162, wherein the actuator comprises a plurality of pistons positioned within corresponding piston chambers.

167. The apparatus of claim 142, further comprising:
a cutting device for cutting the tubular member coupled to the support member.

168. The apparatus of claim 167, wherein the cutting device comprises:
a support member; and
a plurality of movable cutting elements coupled to the support member.

169. The apparatus of claim 168, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

170. The apparatus of claim 169, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

171. The apparatus of claim 170, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

172. The apparatus of claim 169, wherein the cutting elements comprise:
a first set of cutting elements; and
a second set of cutting elements;
wherein the first set of cutting elements are interleaved with the second set of cutting elements.

173. The apparatus of claim 172, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

174. The apparatus of claim 172, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

175. The apparatus of claim 142, wherein at least one of the first second expansion devices comprise:
a support member; and
a plurality of movable expansion elements coupled to the support member.

176. The apparatus of claim 175, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

177. The apparatus of claim 176, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

178. The apparatus of claim 177, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

179. The apparatus of claim 176, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

180. The apparatus of claim 179, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

181. The apparatus of claim 179, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

182. The apparatus of claim 142, wherein at least one of the first and second expansion devices comprise a plurality of expansion devices.

183. The apparatus of claim 182, wherein at least one of the first and second expansion device comprise an adjustable expansion device.

184. The apparatus of claim 183, wherein the adjustable expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

185. The apparatus of claim 184, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

186. The apparatus of claim 185, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

187. The apparatus of claim 186, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

188. The apparatus of claim 185, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

189. The apparatus of claim 188, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

190. The apparatus of claim 188, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

191. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:

a support member;

an expansion device for radially expanding and plastically deforming the tubular member coupled to the support member; and

a packer coupled to the support member.

192. The apparatus of claim 191, further comprising:

a gripping device for gripping the tubular member coupled to the support member.

193. The apparatus of claim 192, wherein the gripping device comprises a plurality of movable gripping elements.

194. The apparatus of claim 193, wherein the gripping elements are moveable in a radial direction relative to the support member.

195. The apparatus of claim 193, wherein the gripping elements are moveable in an axial direction relative to the support member.

196. The apparatus of claim 193, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

197. The apparatus of claim 193, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

198. The apparatus of claim 193, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the

second position, the gripping elements move in a radial direction relative to the support member.

199. The apparatus of claim 193, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

200. The apparatus of claim 193, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

201. The apparatus of claim 193, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

202. The apparatus of claim 193, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

203. The apparatus of claim 191, further comprising:

a sealing device for sealing an interface with the tubular member coupled to the support member.

204. The apparatus of claim 203, wherein the sealing device seals an annulus defines between the support member and the tubular member.

205. The apparatus of claim 191, further comprising:

a locking device for locking the position of the tubular member relative to the support member.

206. The apparatus of claim 191, wherein the packer assembly comprises:

a packer; and

a packer control device for controlling the operation of the packer coupled to the support member.

207. The apparatus of claim 206, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve movably positioned within the passage of the support member.

208. The apparatus of claim 206, wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the packer.

209. The apparatus of claim 206, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve positioned within the passage of the support member; and

wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the sliding sleeve valve.

210. The apparatus of claim 191, further comprising:

an actuator for displacing the expansion device relative to the support member.

211. The apparatus of claim 210, wherein the actuator comprises:
a first actuator for pulling the expansion device; and
a second actuator for pushing the expansion device.

214. The apparatus of claim 210, wherein the actuator comprises means for transferring torsional loads between the support member and the expansion device.

215. The apparatus of claim 211, wherein the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device.

216. The apparatus of claim 210, wherein the actuator comprises a plurality of pistons positioned within corresponding piston chambers.

217. The apparatus of claim 191, further comprising a cutting device coupled to the support member for cutting the tubular member.

218. The apparatus of claim 217, wherein the cutting device comprises:
a support member; and
a plurality of movable cutting elements coupled to the support member.

219. The apparatus of claim 218, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

220. The apparatus of claim 219, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

221. The apparatus of claim 220, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

222. The apparatus of claim 219, wherein the cutting elements comprise:
a first set of cutting elements; and

a second set of cutting elements;

wherein the first set of cutting elements are interleaved with the second set of cutting elements.

223. The apparatus of claim 222, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

224. The apparatus of claim 222, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

225. The apparatus of claim 191, wherein the expansion device comprises:

a support member; and

a plurality of movable expansion elements coupled to the support member.

226. The apparatus of claim 225, further comprising:

an actuator coupled to the support member for moving the expansion elements between a first position and a second position;

wherein in the first position, the expansion elements do not engage the tubular member; and

wherein in the second position, the expansion elements engage the tubular member.

227. The apparatus of claim 226, further comprising:

a sensor coupled to the support member for sensing the internal diameter of the tubular member.

228. The apparatus of claim 227, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

229. The apparatus of claim 226, wherein the expansion elements comprise:

a first set of expansion elements; and

a second set of expansion elements;

wherein the first set of expansion elements are interleaved with the second set of expansion elements.

230. The apparatus of claim 229, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

231. The apparatus of claim 229, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

232. The apparatus of claim 191, wherein the expansion device comprises an adjustable expansion device.

233. The apparatus of claim 191, wherein the expansion device comprises a plurality of expansion devices.

234. The apparatus of claim 233, wherein at least one of the expansion devices comprises an adjustable expansion device.

235. The apparatus of claim 234, wherein the adjustable expansion device comprises:
a support member; and
a plurality of movable expansion elements coupled to the support member.

236. The apparatus of claim 235, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

237. The apparatus of claim 236, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

238. The apparatus of claim 237, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

239. The apparatus of claim 236, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

240. The apparatus of claim 239, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

241. The apparatus of claim 239, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

242. An apparatus for radially expanding and plastically deforming an expandable tubular member, comprising:

a support member;

a cutting device for cutting the tubular member coupled to the support member;

a gripping device for gripping the tubular member coupled to the support member;

a sealing device for sealing an interface with the tubular member coupled to the support member;

a locking device for locking the position of the tubular member relative to the support member;

a first adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member;

a second adjustable expansion device for radially expanding and plastically deforming the tubular member coupled to the support member;

a packer coupled to the support member; and

an actuator for displacing one or more of the sealing assembly, first and second adjustable expansion devices, and packer relative to the support member.

243. The apparatus of claim 242, wherein the gripping device comprises a plurality of movable gripping elements.

244. The apparatus of claim 243, wherein the gripping elements are moveable in a radial direction relative to the support member.

245. The apparatus of claim 243, wherein the gripping elements are moveable in an axial direction relative to the support member.

246. The apparatus of claim 243, wherein the gripping elements are moveable in a radial and an axial direction relative to the support member.

247. The apparatus of claim 243, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction relative to the support member.

248. The apparatus of claim 243, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction relative to the support member.

249. The apparatus of claim 243, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction relative to the support member.

250. The apparatus of claim 243, wherein, if the tubular member is displaced in a first axial direction, the gripping device grips the tubular member; and wherein, if the tubular member is displaced in a second axial direction, the gripping device does not grip the tubular member.

251. The apparatus of claim 243, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, the gripping elements are biased to remain in the first position.

252. The apparatus of claim 243, wherein the gripping device further comprises:

an actuator for moving the gripping elements from a first position to a second position;

wherein in the first position, the gripping elements do not engage the tubular member;

wherein in the second position, the gripping elements do engage the tubular member; and

wherein the actuator is a fluid powered actuator.

253. The apparatus of claim 242, wherein the sealing device seals an annulus defines between the support member and the tubular member.

254. The apparatus of claim 242, wherein the packer assembly comprises:

a packer; and

a packer control device for controlling the operation of the packer coupled to the support member.

255. The apparatus of claim 254, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve movably positioned within the passage of the support member.

256. The apparatus of claim 254, wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the packer.

257. The apparatus of claim 254, wherein the packer comprises:

a support member defining a passage;

a shoe comprising a float valve coupled to an end of the support member;

one or more compressible packer elements movably coupled to the support member; and

a sliding sleeve valve positioned within the passage of the support member; and

wherein the packer control device comprises:

a support member;

one or more drag blocks releasably coupled to the support member; and

a stinger coupled to the support member for engaging the sliding sleeve valve.

258. The apparatus of claim 242, wherein the actuator comprises:
a first actuator for pulling the expansion device; and
a second actuator for pushing the expansion device.

259. The apparatus of claim 242, wherein the actuator comprises means for transferring torsional loads between the support member and the expansion device.

260. The apparatus of claim 258, wherein the first and second actuators comprise means for transferring torsional loads between the support member and the expansion device.

261. The apparatus of claim 242, wherein the actuator comprises a plurality of pistons positioned within corresponding piston chambers.

262. The apparatus of claim 242, wherein the cutting device comprises:
a support member; and
a plurality of movable cutting elements coupled to the support member.

263. The apparatus of claim 262, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

264. The apparatus of claim 263, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

265. The apparatus of claim 264, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

266. The apparatus of claim 263, wherein the cutting elements comprise:
a first set of cutting elements; and
a second set of cutting elements;
wherein the first set of cutting elements are interleaved with the second set of cutting elements.

267. The apparatus of claim 266, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

268. The apparatus of claim 266, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

269. The apparatus of claim 242, wherein at least one of the adjustable expansion devices comprise:
a support member; and
a plurality of movable expansion elements coupled to the support member.

270. The apparatus of claim 269, further comprising:
an actuator coupled to the support member for moving the expansion elements between a first position and a second position;
wherein in the first position, the expansion elements do not engage the tubular member; and
wherein in the second position, the expansion elements engage the tubular member.

271. The apparatus of claim 270, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

272. The apparatus of claim 271, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

273. The apparatus of claim 270, wherein the expansion elements comprise:
a first set of expansion elements; and
a second set of expansion elements;
wherein the first set of expansion elements are interleaved with the second set of expansion elements.

274. The apparatus of claim 273, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

275. The apparatus of claim 273, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

276. The apparatus of claim 242, wherein at least one of the adjustable expansion devices comprise a plurality of expansion devices.

277. The apparatus of claim 276, wherein at least one of the adjustable expansion devices comprise:

a support member; and

a plurality of movable expansion elements coupled to the support member.

278. The apparatus of claim 277, further comprising:

an actuator coupled to the support member for moving the expansion elements between a first position and a second position;

wherein in the first position, the expansion elements do not engage the tubular member; and

wherein in the second position, the expansion elements engage the tubular member.

279. The apparatus of claim 278, further comprising:

a sensor coupled to the support member for sensing the internal diameter of the tubular member.

280. The apparatus of claim 279, wherein the sensor prevents the expansion elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

281. The apparatus of claim 278, wherein the expansion elements comprise:

a first set of expansion elements; and

a second set of expansion elements;

wherein the first set of expansion elements are interleaved with the second set of expansion elements.

282. The apparatus of claim 281, wherein in the first position, the first set of expansion elements are not axially aligned with the second set of expansion elements.

283. The apparatus of claim 281, wherein in the second position, the first set of expansion elements are axially aligned with the second set of expansion elements.

284. An apparatus for cutting a tubular member, comprising:
a support member; and
a plurality of movable cutting elements coupled to the support member.

285. The apparatus of claim 284, further comprising:
an actuator coupled to the support member for moving the cutting elements between a first position and a second position;
wherein in the first position, the cutting elements do not engage the tubular member; and
wherein in the second position, the cutting elements engage the tubular member.

286. The apparatus of claim 285, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

287. The apparatus of claim 286, wherein the sensor prevents the cutting elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

288. The apparatus of claim 285, wherein the cutting elements comprise:
a first set of cutting elements; and
a second set of cutting elements;
wherein the first set of cutting elements are interleaved with the second set of cutting elements.

289. The apparatus of claim 288, wherein in the first position, the first set of cutting elements are not axially aligned with the second set of cutting elements.

290. The apparatus of claim 288, wherein in the second position, the first set of cutting elements are axially aligned with the second set of cutting elements.

291. An apparatus for engaging a tubular member, comprising:
a support member; and
a plurality of movable elements coupled to the support member.

292. The apparatus of claim 291, further comprising:
an actuator coupled to the support member for moving the elements between a first position and a second position;
wherein in the first position, the elements do not engage the tubular member; and
wherein in the second position, the elements engage the tubular member.

293. The apparatus of claim 292, further comprising:
a sensor coupled to the support member for sensing the internal diameter of the tubular member.

294. The apparatus of claim 293, wherein the sensor prevents the elements from being moved to the second position if the internal diameter of the tubular member is less than a predetermined value.

295. The apparatus of claim 292, wherein the elements comprise:
a first set of elements; and
a second set of elements;
wherein the first set of elements are interleaved with the second set of elements.

296. The apparatus of claim 295, wherein in the first position, the first set of elements are not axially aligned with the second set of elements.

297. The apparatus of claim 295, wherein in the second position, the first set of elements are axially aligned with the second set of elements.

298. An apparatus for gripping a tubular member, comprising:
a plurality of movable gripping elements.

299. The apparatus of claim 298, wherein the gripping elements are moveable in a radial direction.

300. The apparatus of claim 298, wherein the gripping elements are moveable in an axial direction.

301. The apparatus of claim 298, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do

engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial and an axial direction.

302. The apparatus of claim 298, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in a radial direction.

303. The apparatus of claim 298, wherein the gripping elements are moveable from a first position to a second position; wherein in the first position, the gripping elements do not engage the tubular member; wherein in the second position, the gripping elements do engage the tubular member; and wherein, during the movement from the first position to the second position, the gripping elements move in an axial direction.

304. The apparatus of claim 298, wherein, in a first axial direction, the gripping device grips the tubular member; and wherein, in a second axial direction, the gripping device does not grip the tubular member.

305. The apparatus of claim 298, further comprising an actuator for moving the gripping elements.

306. The apparatus of claim 298, wherein the gripping elements comprise:
a plurality of separate and distinct gripping elements.

307. An actuator, comprising:
a tubular housing;
a tubular piston rod movably coupled to and at least partially positioned within the housing;
a plurality of annular piston chambers defined by the tubular housing and the tubular piston rod; and
a plurality of tubular pistons coupled to the tubular piston rod, each tubular piston movably positioned within a corresponding annular piston chamber.

308. The actuator of claim 307, further comprising means for transmitting torsional loads between the tubular housing and the tubular piston rod.

309. An apparatus for controlling a packer, comprising:
a tubular support member;
one or more drag blocks releasably coupled to the tubular support member; and
a tubular stinger coupled to the tubular support member for engaging the packer.

310. The apparatus of claim 309, further comprising a tubular sleeve coupled to the drag blocks.

311. The apparatus of claim 309, wherein the tubular support member comprises one or more axially aligned teeth for engaging the packer.

312. A packer comprising:
a support member defining a passage;
a shoe comprising a float valve coupled to an end of the support member;
one or more compressible packer elements movably coupled to the support member; and
a sliding sleeve valve movably positioned within the passage of the support member.

313. A method of radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing, comprising:
positioning the tubular member within the borehole in overlapping relation to the wellbore casing;
radially expanding and plastically deforming a portion of the tubular member to form a bell section; and
radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing;
wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section.

314. The method of claim 313, wherein radially expanding and plastically deforming a portion of the tubular member to form a bell section comprises:
positioning an adjustable expansion device within the expandable tubular member;
supporting the expandable tubular member and the adjustable expansion device within the borehole;
lowering the adjustable expansion device out of the expandable tubular member;

increasing the outside dimension of the adjustable expansion device; and

displacing the adjustable expansion device upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member, wherein n is greater than or equal to 1.

315. A method for forming a mono diameter wellbore casing, comprising:

positioning an adjustable expansion device within a first expandable tubular member;

supporting the first expandable tubular member and the adjustable expansion device within a borehole;

lowering the adjustable expansion device out of the first expandable tubular member;

increasing the outside dimension of the adjustable expansion device;

displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole;

positioning the adjustable expansion device within a second expandable tubular member;

supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member;

lowering the adjustable expansion device out of the second expandable tubular member;

increasing the outside dimension of the adjustable expansion device; and

displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

316. A method for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

positioning an adjustable expansion device within the expandable tubular member;

supporting the expandable tubular member and the adjustable expansion device within the borehole;

lowering the adjustable expansion device out of the expandable tubular member;

increasing the outside dimension of the adjustable expansion device;

displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and

pressurizing an interior region of the expandable tubular member above the

adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

317. A method for forming a mono diameter wellbore casing, comprising:

positioning an adjustable expansion device within a first expandable tubular member;

supporting the first expandable tubular member and the adjustable expansion device within a borehole;

lowering the adjustable expansion device out of the first expandable tubular member;

increasing the outside dimension of the adjustable expansion device;

displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole;

pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole;

positioning the adjustable expansion mandrel within a second expandable tubular member;

supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member;

lowering the adjustable expansion mandrel out of the second expandable tubular member;

increasing the outside dimension of the adjustable expansion mandrel;

displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and

pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

318. A method for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

positioning first and second adjustable expansion devices within the expandable tubular member;

supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole;

lowering the first adjustable expansion device out of the expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member;

displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

319. A method for forming a mono diameter wellbore casing, comprising:

positioning first and second adjustable expansion devices within a first expandable tubular member;

supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole;

lowering the first adjustable expansion device out of the first expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member;

displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member;

positioning first and second adjustable expansion devices within a second expandable tubular member;

supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member;

lowering the first adjustable expansion device out of the second expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member;

displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and

displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

320. A method for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

positioning first and second adjustable expansion devices within the expandable tubular member;

supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole;

lowering the first adjustable expansion device out of the expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member;

pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device;

displacing the first adjustable expansion device and the second adjustable expansion

device downwardly relative to the expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and

pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the expandable tubular member by the second adjustable expansion device;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

321. A method for forming a mono diameter wellbore casing, comprising:

positioning first and second adjustable expansion devices within a first expandable tubular member;

supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole;

lowering the first adjustable expansion device out of the first expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member;

pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first expandable tubular member by the first adjustable expansion device;

displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member;

pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device;

positioning first and second adjustable expansion devices within a second expandable tubular member;

supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member;

lowering the first adjustable expansion device out of the second expandable tubular member;

increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member;

pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device;

displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member;

decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and

pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

322. A method for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole;

increasing the size of the adjustable expansion device; and

displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member.

323. The method of claim 322, further comprising:

reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed.

324. The method of claim 323, further comprising:

fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device.

325. The method of claim 324, further comprising:

permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member.

326. The method of claim 325, further comprising:

injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and a preexisting structure after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

327. The method of claim 325, further comprising:

increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

328. The method of claim 327, further comprising:

displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member.

329. The method of claim 328, further comprising:
if the end of the other portion of the expandable tubular member overlaps with a preexisting structure, then
not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and
displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the other portion of the expandable tubular member that overlaps with the preexisting structure.

330. A method for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing, comprising:
supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole;
increasing the size of the adjustable expansion device;
displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member; and
displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member.

331. The method of claim 330, further comprising:
reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed.

332. The method of claim 331, further comprising:
fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device.

333. The method of claim 332, further comprising:

permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member.

334. The method of claim 333, further comprising:

injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the borehole after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

335. The method of claim 333, further comprising:

increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

336. The method of claim 335, further comprising:

displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member.

337. The method of claim 336, further comprising:

not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and

displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the remaining portion of the expandable tubular member that overlaps with the preexisting wellbore casing after not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

338. A method of radially expanding and plastically deforming a tubular member, comprising:

positioning the tubular member within a preexisting structure;

radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and

radially expanding and plastically deforming a portion of the tubular member above the bell section.

339. The method of claim 338, wherein positioning the tubular member within a preexisting structure comprises:

locking the tubular member to an expansion device.

340. The method of claim 339, wherein the outside diameter of the expansion device is less than the inside diameter of the tubular member.

341. The method of claim 339, wherein the expansion device is positioned within the tubular member.

342. The method of claim 339, wherein the expansion device comprises an adjustable expansion device.

343. The method of claim 342, wherein the adjustable expansion device is adjustable to a plurality of sizes.

344. The method of claim 339, wherein the expansion device comprises a plurality of expansion devices.

345. The method of claim 344, wherein at least one of the expansion devices comprises an adjustable expansion device.

346. The method of claim 345, wherein at least one of the adjustable expansion device is adjustable to a plurality of sizes.

347. The method of claim 338, wherein radially expanding and plastically deforming a lower portion of the tubular member to form a bell section comprises:

lowering an expansion device out of an end of the tubular member; and

pulling the expansion device through the end of the tubular member.

348. The method of claim 347, wherein lowering an expansion device out of an end of the tubular member comprises:

lowering the expansion device out of the end of the tubular member; and

adjusting the size of the expansion device.

349. The method of claim 348, wherein the adjustable expansion device is adjustable to a plurality of sizes.

350. The method of claim 348, wherein the expansion device comprises a plurality of adjustable expansion devices.

351. The method of claim 350, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

352. The method of claim 347, wherein pulling the expansion device through the end of the tubular member comprises:

gripping the tubular member; and

pulling an expansion device through an end of the tubular member.

353. The method of claim 352, wherein gripping the tubular member comprises:

permitting axial displacement of the tubular member in a first direction; and

not permitting axial displacement of the tubular member in a second direction.

354. The method of claim 352, wherein pulling the expansion device through the end of the tubular member comprises:

pulling the expansion device through the end of the tubular member using an actuator.

355. The method of claim 338, wherein radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

lowering an expansion device out of an end of the tubular member; and

pulling the expansion device through the end of the tubular member.

356. The method of claim 355, wherein lowering an expansion device out of an end of the tubular member comprises:

lowering the expansion device out of the end of the tubular member; and

adjusting the size of the expansion device.

357. The method of claim 356, wherein the adjustable expansion device is adjustable to a plurality of sizes.

358. The method of claim 356, wherein the expansion device comprises a plurality of adjustable expansion devices.

359. The method of claim 358, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

360. The method of claim 355, wherein pulling the expansion device through the end of the tubular member comprises:

gripping the tubular member; and

pulling an expansion device through an end of the tubular member.

361. The method of claim 360, wherein gripping the tubular member comprises:

permitting axial displacement of the tubular member in a first direction; and

not permitting axial displacement of the tubular member in a second direction.

362. The method of claim 360, wherein pulling the expansion device through the end of the tubular member comprises:

pulling the expansion device through the end of the tubular member using an actuator.

363. The method of claim 355, wherein pulling the expansion device through the end of the tubular member comprises:

pulling the expansion device through the end of the tubular member using fluid pressure.

364. The method of claim 363, wherein pulling the expansion device through the end of the tubular member using fluid pressure comprises:

pressurizing an annulus within the tubular member above the expansion device.

365. The method of claim 338, wherein radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

fluidicly sealing an end of the tubular member; and

pulling the expansion device through the tubular member.

366. The method of claim 365, wherein the expansion device is adjustable.

367. The method of claim 366, wherein the expansion device is adjustable to a plurality of sizes.

368. The method of claim 365, wherein the expansion device comprises a plurality of adjustable expansion devices.

369. The method of claim 368, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

370. The method of claim 365, wherein pulling the expansion device through the end of the tubular member comprises:

gripping the tubular member; and

pulling an expansion device through an end of the tubular member.

371. The method of claim 370, wherein gripping the tubular member comprises:

permitting axial displacement of the tubular member in a first direction; and

not permitting axial displacement of the tubular member in a second direction.

372. The method of claim 370, wherein pulling the expansion device through the end of the tubular member comprises:

pulling the expansion device through the end of the tubular member using an actuator.

373. The method of claim 365, wherein pulling the expansion device through the end of the tubular member comprises:

pulling the expansion device through the end of the tubular member using fluid pressure.

374. The method of claim 373, wherein pulling the expansion device through the end of the tubular member using fluid pressure comprises:

pressurizing an annulus within the tubular member above the expansion device.

375. The method of claim 338, wherein radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

overlapping the portion of the tubular member above the bell section with an end of a preexisting tubular member; and

pulling an expansion device through the overlapping portions of the tubular member and the preexisting tubular member.

376. The method of claim 375, wherein the expansion device is adjustable.

377. The method of claim 376, wherein the expansion device is adjustable to a plurality of sizes.

378. The method of claim 375, wherein the expansion device comprises a plurality of adjustable expansion devices.

379. The method of claim 378, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

380. The method of claim 375, wherein pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

gripping the tubular member; and

pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member.

381. The method of claim 380, wherein gripping the tubular member comprises:

permitting axial displacement of the tubular member in a first direction; and

not permitting axial displacement of the tubular member in a second direction.

382. The method of claim 380, wherein pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using an actuator.

383. The method of claim 375, wherein pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure.

384. The method of claim 383, wherein pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure comprises:

pressurizing an annulus within the tubular member above the expansion device.

385. The method of claim 375, further comprising:

cutting an end of the portion of the tubular member that overlaps with the preexisting tubular member.

386. The method of claim 385, further comprising:

removing the cut off end of the expandable tubular member from the preexisting structure.

387. The method of claim 338, further comprising:

injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the preexisting structure.

388. The method of claim 338, further comprising:

cutting off an end of the expandable tubular member.

389. The method of claim 388, further comprising:

removing the cut off end of the expandable tubular member from the preexisting structure.

390. A method of radially expanding and plastically deforming a tubular member, comprising:

applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another.

391. A system for radially expanding and plastically deforming an expandable tubular member within a borehole having a preexisting wellbore casing, comprising:

means for positioning the tubular member within the borehole in overlapping relation to the wellbore casing;

means for radially expanding and plastically deforming a portion of the tubular member to form a bell section; and

means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprising a portion of the tubular member that overlaps with the wellbore casing;

wherein the inside diameter of the bell section is greater than the inside diameter of the radially expanded and plastically deformed portion of the tubular member above the bell section.

392. The system of claim 391, wherein means for radially expanding and plastically deforming a portion of the tubular member to form a bell section comprises:

means for positioning an adjustable expansion device within the expandable tubular member;

means for supporting the expandable tubular member and the adjustable expansion device within the borehole;

means for lowering the adjustable expansion device out of the expandable tubular member;

means for increasing the outside dimension of the adjustable expansion device; and

means for displacing the adjustable expansion device upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member, wherein n is greater than or equal to 1.

393. A system for forming a mono diameter wellbore casing, comprising:

means for positioning an adjustable expansion device within a first expandable tubular member;

means for supporting the first expandable tubular member and the adjustable expansion device within a borehole;

means for lowering the adjustable expansion device out of the first expandable tubular member;

means for increasing the outside dimension of the adjustable expansion device;

means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole;

means for positioning the adjustable expansion device within a second expandable tubular member;

means for supporting the second expandable tubular member and the adjustable expansion device within the borehole in overlapping relation to the first expandable tubular member;

means for lowering the adjustable expansion device out of the second expandable tubular member;

means for increasing the outside dimension of the adjustable expansion device; and

means for displacing the adjustable expansion device upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole.

394. A system for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

means for positioning an adjustable expansion device within the expandable tubular member;

means for supporting the expandable tubular member and the adjustable expansion device within the borehole;

means for lowering the adjustable expansion device out of the expandable tubular member;

means for increasing the outside dimension of the adjustable expansion device;

means for displacing the adjustable expansion mandrel upwardly relative to the expandable tubular member n times to radially expand and plastically deform n portions of the expandable tubular member within the borehole; and

means for pressurizing an interior region of the expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the expandable tubular member within the borehole.

395. A system for forming a mono diameter wellbore casing, comprising:

means for positioning an adjustable expansion device within a first expandable tubular member;

means for supporting the first expandable tubular member and the adjustable expansion device within a borehole;

means for lowering the adjustable expansion device out of the first expandable tubular member;

means for increasing the outside dimension of the adjustable expansion device;

means for displacing the adjustable expansion device upwardly relative to the first expandable tubular member m times to radially expand and plastically deform m portions of the first expandable tubular member within the borehole;

means for pressurizing an interior region of the first expandable tubular member above the adjustable expansion device during the radial expansion and plastic deformation of the first expandable tubular member within the borehole;

means for positioning the adjustable expansion mandrel within a second expandable tubular member;

means for supporting the second expandable tubular member and the adjustable expansion mandrel within the borehole in overlapping relation to the first expandable tubular member;

means for lowering the adjustable expansion mandrel out of the second expandable tubular member;

means for increasing the outside dimension of the adjustable expansion mandrel;

means for displacing the adjustable expansion mandrel upwardly relative to the second expandable tubular member n times to radially expand and plastically deform n portions of the second expandable tubular member within the borehole; and

means for pressurizing an interior region of the second expandable tubular member above the adjustable expansion mandrel during the radial expansion and plastic deformation of the second expandable tubular member within the borehole.

396. A system for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

means for positioning first and second adjustable expansion devices within the expandable tubular member;

means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole;

means for lowering the first adjustable expansion device out of the expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device;

means for displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

means for displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

397. A system for forming a mono diameter wellbore casing, comprising:

means for positioning first and second adjustable expansion devices within a first expandable tubular member;

means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole;

means for lowering the first adjustable expansion device out of the first expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member;

means for positioning first and second adjustable expansion devices within a second expandable tubular member;

means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member;

means for lowering the first adjustable expansion device out of the second expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device; displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device; and

means for displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

398. A system for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

means for positioning first and second adjustable expansion devices within the expandable tubular member;

means for supporting the expandable tubular member and the first and second adjustable expansion devices within the borehole;

means for lowering the first adjustable expansion device out of the expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device;

means for displacing the first adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform a lower portion of the expandable tubular member;

means for pressurizing an interior region of the expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the expandable tubular member by the first adjustable expansion device;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

means for displacing the second adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform portions of the expandable tubular member above the lower portion of the expandable tubular member; and

means for pressurizing an interior region of the expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the expandable tubular member above the lower portion of the expandable tubular member by the second adjustable expansion device;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

399. A system for forming a mono diameter wellbore casing, comprising:

means for positioning first and second adjustable expansion devices within a first expandable tubular member;

means for supporting the first expandable tubular member and the first and second adjustable expansion devices within a borehole;

means for lowering the first adjustable expansion device out of the first expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device;

displacing the first adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform a lower portion of the first expandable tubular member;

means for pressurizing an interior region of the first expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the first expandable tubular member by the first adjustable expansion device;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the first expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

means for displacing the second adjustable expansion device upwardly relative to the first expandable tubular member to radially expand and plastically deform portions of the first expandable tubular member above the lower portion of the expandable tubular member;

means for pressurizing an interior region of the first expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the first expandable tubular member above the lower portion of the first expandable tubular member by the second adjustable expansion device;

means for positioning first and second adjustable expansion devices within a second expandable tubular member;

means for supporting the first expandable tubular member and the first and second adjustable expansion devices within the borehole in overlapping relation to the first expandable tubular member;

means for lowering the first adjustable expansion device out of the second expandable tubular member;

means for increasing the outside dimension of the first adjustable expansion device;

means for displacing the first adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform a lower portion of the second expandable tubular member;

means for pressurizing an interior region of the second expandable tubular member above the first adjustable expansion device during the radial expansion of the lower portion of the second expandable tubular member by the first adjustable expansion device;

means for displacing the first adjustable expansion device and the second adjustable expansion device downwardly relative to the second expandable tubular member;

means for decreasing the outside dimension of the first adjustable expansion device and increasing the outside dimension of the second adjustable expansion device;

means for displacing the second adjustable expansion device upwardly relative to the second expandable tubular member to radially expand and plastically deform portions of the second expandable tubular member above the lower portion of the second expandable tubular member; and

means for pressurizing an interior region of the second expandable tubular member above the second adjustable expansion device during the radial expansion of the portions of the second expandable tubular member above the lower portion of the second expandable tubular member by the second adjustable expansion device;

wherein the outside dimension of the first adjustable expansion device is greater than the outside dimension of the second adjustable expansion device.

400. A system for radially expanding and plastically deforming an expandable tubular member within a borehole, comprising:

means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole;

means for increasing the size of the adjustable expansion device; and

means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member.

401. The system of claim 400, further comprising:
means for reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed.

402. The system of claim 401, further comprising:
means for fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device.

403. The system of claim 402, further comprising:
means for permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member.

404. The system of claim 403, further comprising:
means for injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and a preexisting structure after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

405. The system of claim 403, further comprising:
means for increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

406. The system of claim 405, further comprising:
means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member.

407. The system of claim 406, further comprising:
if the end of the other portion of the expandable tubular member overlaps with a preexisting structure, then
means for not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and

means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the other portion of the expandable tubular member that overlaps with the preexisting structure.

408. A system for forming a mono diameter wellbore casing within a borehole that includes a preexisting wellbore casing, comprising:
means for supporting the expandable tubular member, an hydraulic actuator, and an adjustable expansion device within the borehole;
means for increasing the size of the adjustable expansion device;
means for displacing the adjustable expansion device upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform a portion of the expandable tubular member; and
means for displacing the adjustable expansion device upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member and a portion of the preexisting wellbore casing that overlaps with an end of the remaining portion of the expandable tubular member.

409. The system of claim 408, further comprising:
means for reducing the size of the adjustable expansion device after the portion of the expandable tubular member has been radially expanded and plastically deformed.

410. The system of claim 409, further comprising:
means for fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member after reducing the size of the adjustable expansion device.

411. The system of claim 410, further comprising:
means for permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator after fluidicly sealing the radially expanded and plastically deformed end of the expandable tubular member.

412. The system of claim 411, further comprising:
means for injecting a hardenable fluidic sealing material into an annulus between the

expandable tubular member and the borehole after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

413. The system of claim 411, further comprising:

means for increasing the size of the adjustable expansion device after permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

414. The system of claim 413, further comprising:

means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member to radially expand and plastically deform the remaining portion of the expandable tubular member.

415. The system of claim 414, further comprising:

means for not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator; and

means for displacing the adjustable expansion cone upwardly relative to the expandable tubular member using the hydraulic actuator to radially expand and plastically deform the end of the remaining portion of the expandable tubular member that overlaps with the preexisting wellbore casing after not permitting the position of the expandable tubular member to float relative to the position of the hydraulic actuator.

416. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning the tubular member within a preexisting structure;

means for radially expanding and plastically deforming a lower portion of the tubular member to form a bell section; and

means for radially expanding and plastically deforming a portion of the tubular member above the bell section.

417. The system of claim 416, wherein positioning the tubular member within a preexisting structure comprises:

means for locking the tubular member to an expansion device.

418. The system of claim 417, wherein the outside diameter of the expansion device is less than the inside diameter of the tubular member.

419. The system of claim 417, wherein the expansion device is positioned within the tubular member.

420. The system of claim 417, wherein the expansion device comprises an adjustable expansion device.

421. The system of claim 420, wherein the adjustable expansion device is adjustable to a plurality of sizes.

422. The system of claim 417, wherein the expansion device comprises a plurality of expansion devices.

423. The system of claim 422, wherein at least one of the expansion devices comprises an adjustable expansion device.

424. The system of claim 423, wherein at least one of the adjustable expansion device is adjustable to a plurality of sizes.

425. The system of claim 416, wherein means for radially expanding and plastically deforming a lower portion of the tubular member to form a bell section comprises:

means for lowering an expansion device out of an end of the tubular member; and

means for pulling the expansion device through the end of the tubular member.

426. The system of claim 425, wherein means for lowering an expansion device out of an end of the tubular member comprises:

means for lowering the expansion device out of the end of the tubular member; and

means for adjusting the size of the expansion device.

427. The system of claim 426, wherein the adjustable expansion device is adjustable to a plurality of sizes.

428. The system of claim 426, wherein the expansion device comprises a plurality of adjustable expansion devices.

429. The system of claim 428, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

430. The system of claim 425, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for gripping the tubular member; and

means for pulling an expansion device through an end of the tubular member.

431. The system of claim 430, wherein means for gripping the tubular member comprises:

means for permitting axial displacement of the tubular member in a first direction; and

means for not permitting axial displacement of the tubular member in a second direction.

432. The system of claim 430, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for pulling the expansion device through the end of the tubular member using an actuator.

433. The system of claim 416, wherein means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

means for lowering an expansion device out of an end of the tubular member; and

means for pulling the expansion device through the end of the tubular member.

434. The system of claim 433, wherein means for lowering an expansion device out of an end of the tubular member comprises:

means for lowering the expansion device out of the end of the tubular member; and

means for adjusting the size of the expansion device.

435. The system of claim 434, wherein the adjustable expansion device is adjustable to a plurality of sizes.

436. The system of claim 434, wherein the expansion device comprises a plurality of adjustable expansion devices.

437. The system of claim 436, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

438. The system of claim 433, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for gripping the tubular member; and

means for pulling an expansion device through an end of the tubular member.

439. The system of claim 438, wherein means for gripping the tubular member comprises:

means for permitting axial displacement of the tubular member in a first direction; and

means for not permitting axial displacement of the tubular member in a second direction.

440. The system of claim 438, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for pulling the expansion device through the end of the tubular member using an actuator.

441. The system of claim 433, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for pulling the expansion device through the end of the tubular member using fluid pressure.

442. The system of claim 441, wherein means for pulling the expansion device through the end of the tubular member using fluid pressure comprises:

means for pressurizing an annulus within the tubular member above the expansion device.

443. The system of claim 416, wherein means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

means for fluidicly sealing an end of the tubular member; and

means for pulling the expansion device through the tubular member.

444. The system of claim 443, wherein the expansion device is adjustable.

445. The system of claim 444, wherein the expansion device is adjustable to a plurality of sizes.

446. The system of claim 443, wherein the expansion device comprises a plurality of adjustable expansion devices.

447. The system of claim 446, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

448. The system of claim 443, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for gripping the tubular member; and

means for pulling an expansion device through an end of the tubular member.

449. The system of claim 448, wherein means for gripping the tubular member comprises:

means for permitting axial displacement of the tubular member in a first direction; and

means for not permitting axial displacement of the tubular member in a second direction.

450. The system of claim 448, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for pulling the expansion device through the end of the tubular member using an actuator.

451. The system of claim 443, wherein means for pulling the expansion device through the end of the tubular member comprises:

means for pulling the expansion device through the end of the tubular member using fluid pressure.

452. The system of claim 451, wherein means for pulling the expansion device through the end of the tubular member using fluid pressure comprises:

means for pressurizing an annulus within the tubular member above the expansion device.

453. The system of claim 416, wherein means for radially expanding and plastically deforming a portion of the tubular member above the bell section comprises:

means for overlapping the portion of the tubular member above the bell section with an end of a preexisting tubular member; and

means for pulling an expansion device through the overlapping portions of the tubular member and the preexisting tubular member.

454. The system of claim 453, wherein the expansion device is adjustable.

455. The system of claim 454, wherein the expansion device is adjustable to a plurality of sizes.

456. The system of claim 453, wherein the expansion device comprises a plurality of adjustable expansion devices.

457. The system of claim 456, wherein at least one of the adjustable expansion devices is adjustable to a plurality of sizes.

458. The system of claim 453, wherein means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

means for gripping the tubular member; and

means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member.

459. The system of claim 458, wherein means for gripping the tubular member comprises:

means for permitting axial displacement of the tubular member in a first direction; and

means for not permitting axial displacement of the tubular member in a second direction.

460. The system of claim 458, wherein means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using an actuator.

461. The system of claim 453, wherein means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member comprises:

means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure.

462. The system of claim 461, wherein means for pulling the expansion device through the overlapping portions of the tubular member and the preexisting tubular member using fluid pressure comprises:

means for pressurizing an annulus within the tubular member above the expansion device.

463. The system of claim 453, further comprising:
means for cutting an end of the portion of the tubular member that overlaps with the preexisting tubular member.

464. The system of claim 463, further comprising:
means for removing the cut off end of the expandable tubular member from the preexisting structure.

465. The system of claim 416, further comprising:
means for injecting a hardenable fluidic sealing material into an annulus between the expandable tubular member and the preexisting structure.

466. The system of claim 416, further comprising:
means for cutting off an end of the expandable tubular member.

467. The system of claim 466, further comprising:
means for removing the cut off end of the expandable tubular member from the preexisting structure.

468. A system of radially expanding and plastically deforming a tubular member, comprising:
a support member; and
means for applying internal pressure to the inside surface of the tubular member at a plurality of discrete location separated from one another coupled to the support member.

469. A method of cutting a tubular member, comprising:
positioning a plurality of cutting elements within the tubular member; and
bringing the cutting elements into engagement with the tubular member.

470. The method of claim 469, wherein the cutting elements comprise:
a first group of cutting elements; and
a second group of cutting elements;

wherein the first group of cutting elements are interleaved with the second group of cutting elements.

471. The method of claim 469, wherein bringing the cutting elements into engagement with the tubular member comprises:

bringing the cutting elements into axial alignment.

472. The method of claim 471, wherein bringing the cutting elements into engagement with the tubular member further comprises:

pivoting the cutting elements.

473. The method of claim 471, wherein bringing the cutting elements into engagement with the tubular member further comprises:

translating the cutting elements.

474. The method of claim 471, wherein bringing the cutting elements into engagement with the tubular member further comprises:

pivoting the cutting elements; and

translating the cutting elements.

475. The method of claim 469, wherein bringing the cutting elements into engagement with the tubular member comprises:

rotating the cutting elements about a common axis.

476. The method of claim 469, wherein bringing the cutting elements into engagement with the tubular member comprises:

pivoting the cutting elements about corresponding axes;

translating the cutting elements; and

rotating the cutting elements about a common axis.

477. The method of claim 469, further comprising:

preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value.

478. The method of claim 477, wherein preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value comprises:

sensing the inside diameter of the tubular member.

479. A method of gripping a tubular member, comprising:

positioning a plurality of gripping elements within the tubular member; and

bringing the gripping elements into engagement with the tubular member.

480. The method of claim 479, wherein bringing the gripping elements into engagement with the tubular member comprises:

displacing the gripping elements in an axial direction; and

displacing the gripping elements in a radial direction.

481. The method of claim 479, further comprising:

biasing the gripping elements against engagement with the tubular member.

482. A method of operating an actuator, comprising:

pressurizing a plurality of pressure chamber.

483. The method of claim 482, further comprising:

transmitting torsional loads.

484. A method of injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure, comprising:

positioning the tubular member into the preexisting structure;

sealing off an end of the tubular member;

operating a valve within the end of the tubular member; and

injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

485. A system for cutting a tubular member, comprising:

means for positioning a plurality of cutting elements within the tubular member; and

means for bringing the cutting elements into engagement with the tubular member.

486. The system of claim 485, wherein the cutting elements comprise:

a first group of cutting elements; and

a second group of cutting elements;

wherein the first group of cutting elements are interleaved with the second group of cutting elements.

487. The system of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member comprises:

means for bringing the cutting elements into axial alignment.

488. The system of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member further comprises:

means for pivoting the cutting elements.

489. The system of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member further comprises:

means for translating the cutting elements.

490. The system of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member further comprises:

means for pivoting the cutting elements; and

means for translating the cutting elements.

491. The method of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member comprises:

means for rotating the cutting elements about a common axis.

492. The system of claim 485, wherein means for bringing the cutting elements into engagement with the tubular member comprises:

means for pivoting the cutting elements about corresponding axes;

means for translating the cutting elements; and

means for rotating the cutting elements about a common axis.

493. The system of claim 485, further comprising:

means for preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value.

494. The system of claim 493, wherein means for preventing the cutting elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value comprises:

means for sensing the inside diameter of the tubular member.

495. A system for gripping a tubular member, comprising:

means for positioning a plurality of gripping elements within the tubular member; and

means for bringing the gripping elements into engagement with the tubular member.

496. The system of claim 495, wherein means for bringing the gripping elements into engagement with the tubular member comprises:

means for displacing the gripping elements in an axial direction; and

means for displacing the gripping elements in a radial direction.

497. The system of claim 495, further comprising:

means for biasing the gripping elements against engagement with the tubular member.

498. An actuator system, comprising:

a support member; and

means for pressurizing a plurality of pressure chambers coupled to the support member.

499. The system of claim 498, further comprising:

means for transmitting torsional loads.

500. A system for injecting a hardenable fluidic sealing material into an annulus between a tubular member and a preexisting structure, comprising:

means for positioning the tubular member into the preexisting structure;

means for sealing off an end of the tubular member;

means for operating a valve within the end of the tubular member; and

means for injecting a hardenable fluidic sealing material through the valve into the annulus between the tubular member and the preexisting structure.

501. A method of engaging a tubular member, comprising:

positioning a plurality of elements within the tubular member; and

bringing the elements into engagement with the tubular member.

502. The method of claim 501, wherein the elements comprise:
a first group of elements; and
a second group of elements;
wherein the first group of elements are interleaved with the second group of elements.

503. The method of claim 501, wherein bringing the elements into engagement with the tubular member comprises:
bringing the elements into axial alignment.

504. The method of claim 501, wherein bringing the elements into engagement with the tubular member further comprises:
pivoting the elements.

505. The method of claim 501, wherein bringing the elements into engagement with the tubular member further comprises:
translating the elements.

506. The method of claim 501, wherein bringing the elements into engagement with the tubular member further comprises:
pivoting the elements; and
translating the elements.

507. The method of claim 501, wherein bringing the elements into engagement with the tubular member comprises:
rotating the elements about a common axis.

508. The method of claim 501, wherein bringing the elements into engagement with the tubular member comprises:
pivoting the elements about corresponding axes;
translating the elements; and
rotating the elements about a common axis.

509. The method of claim 501, further comprising:
preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value.

510. The method of claim 509, wherein preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value comprises:

sensing the inside diameter of the tubular member.

511. A system for engaging a tubular member, comprising:

means for positioning a plurality of elements within the tubular member; and

means for bringing the elements into engagement with the tubular member.

512. The system of claim 511, wherein the elements comprise:

a first group of elements; and

a second group of elements;

wherein the first group of elements are interleaved with the second group of elements.

513. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member comprises:

means for bringing the elements into axial alignment..

514. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member further comprises:

means for pivoting the elements.

515. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member further comprises:

means for translating the elements.

516. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member further comprises:

means for pivoting the elements; and

means for translating the elements.

517. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member comprises:

means for rotating the elements about a common axis.

518. The system of claim 511, wherein means for bringing the elements into engagement with the tubular member comprises:

means for pivoting the elements about corresponding axes;

means for translating the elements; and

means for rotating the elements about a common axis.

519. The system of claim 511, further comprising:

means for preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value.

520. The system of claim 519, wherein means for preventing the elements from coming into engagement with the tubular member if the inside diameter of the tubular member is less than a predetermined value comprises:

means for sensing the inside diameter of the tubular member.

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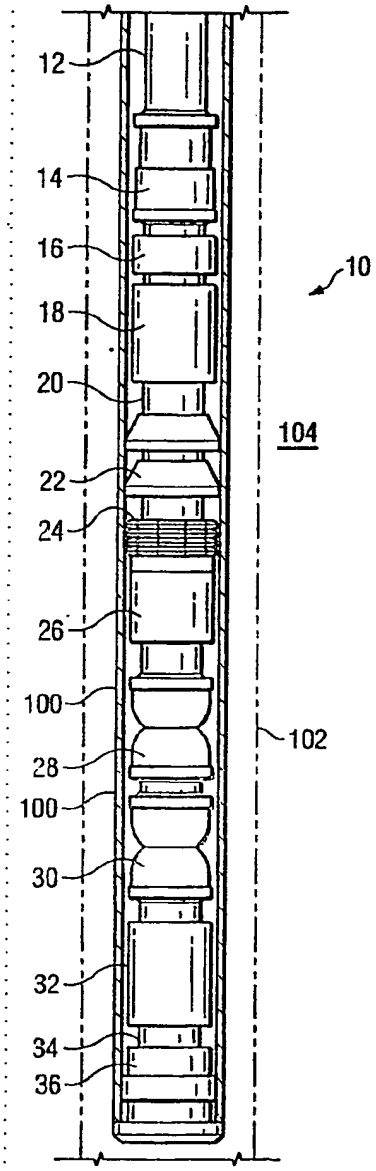

Fig. 1

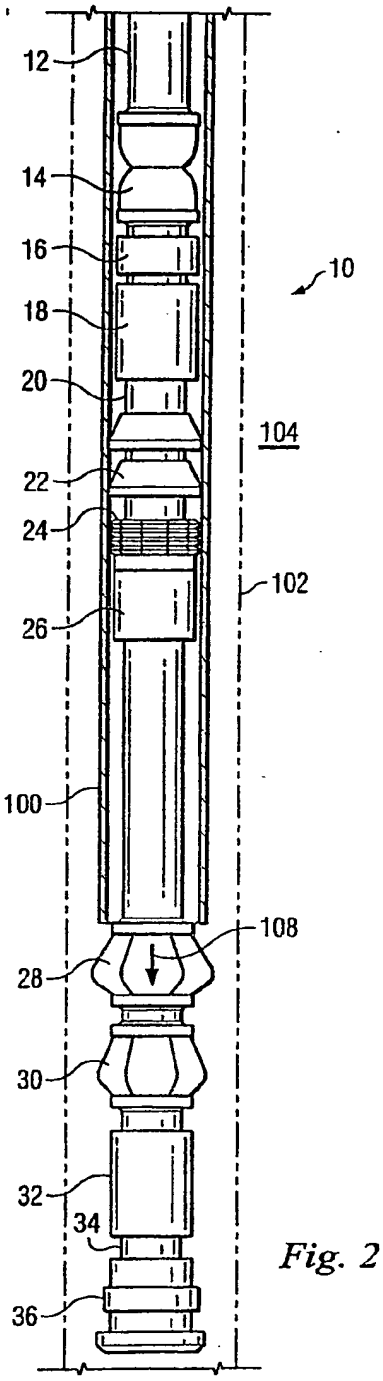

Fig. 2

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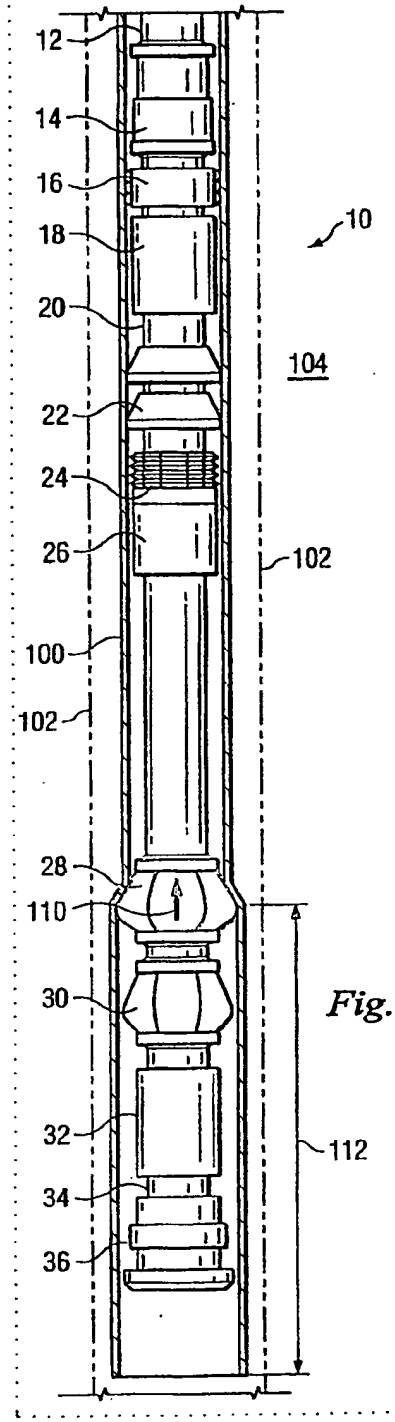


Fig. 3

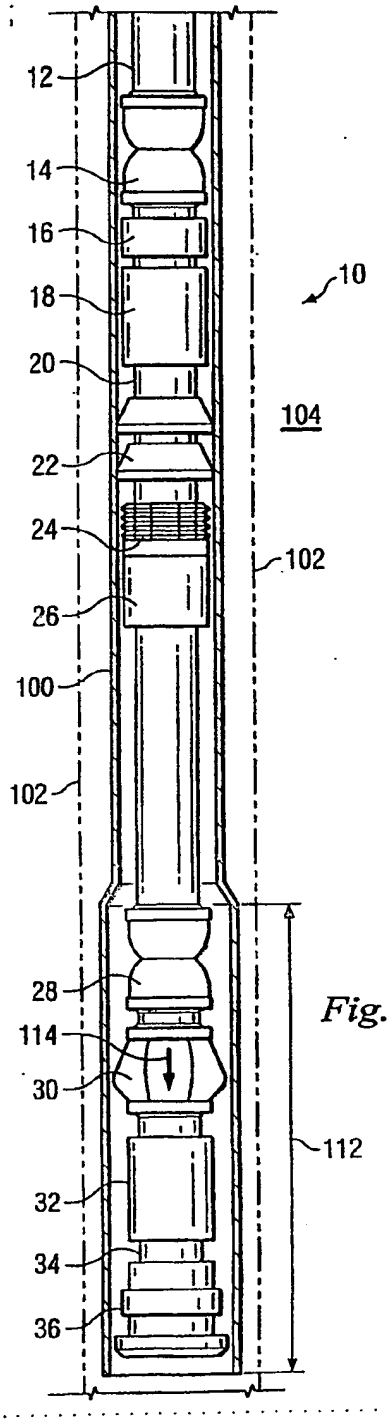


Fig. 4

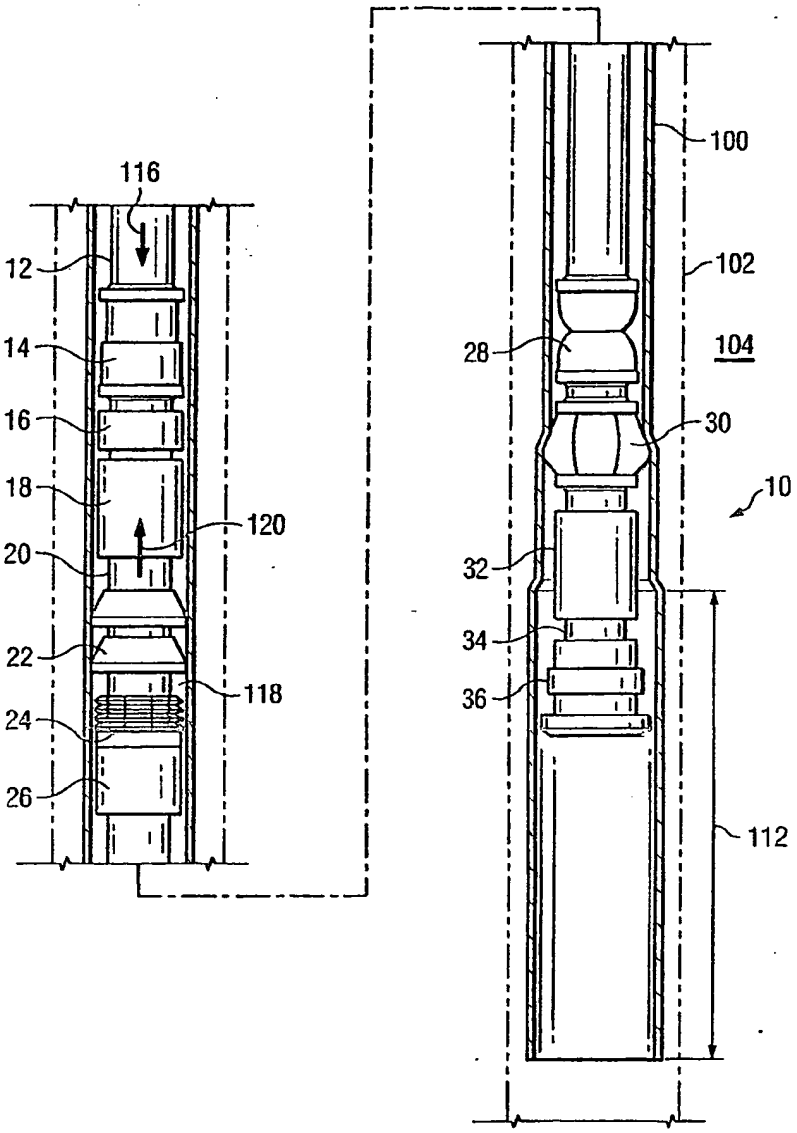


Fig. 5

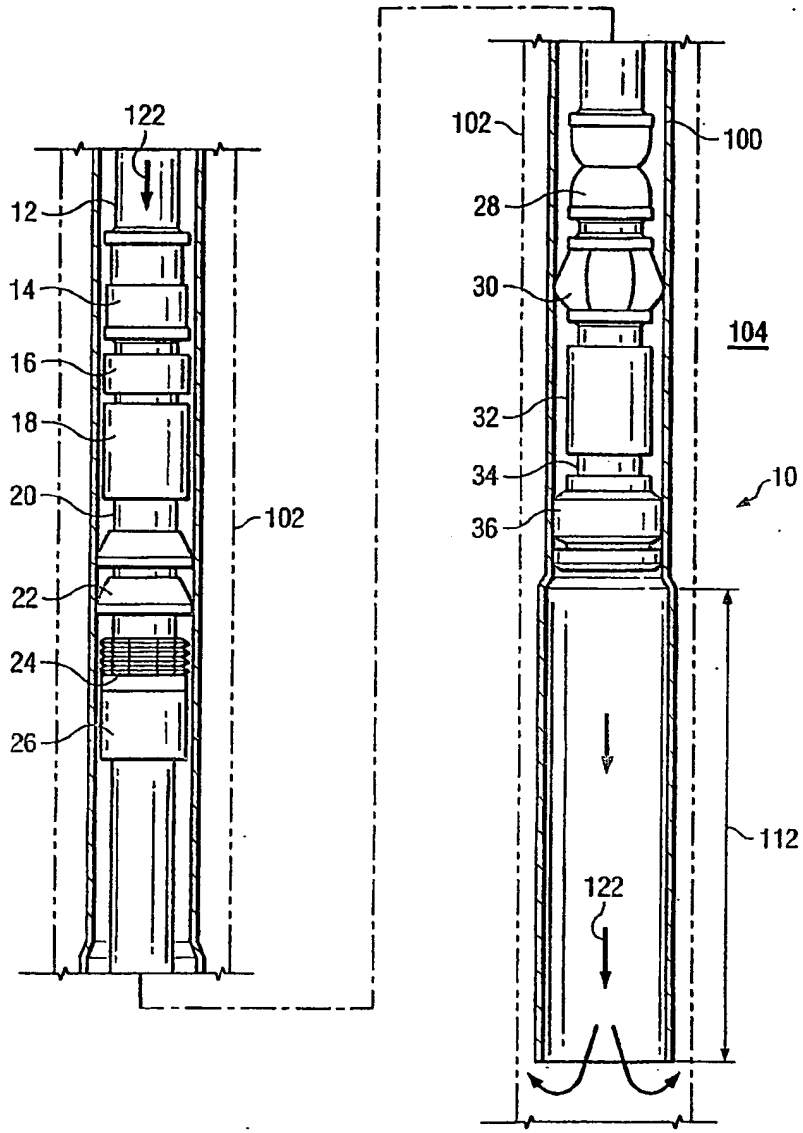


Fig. 6

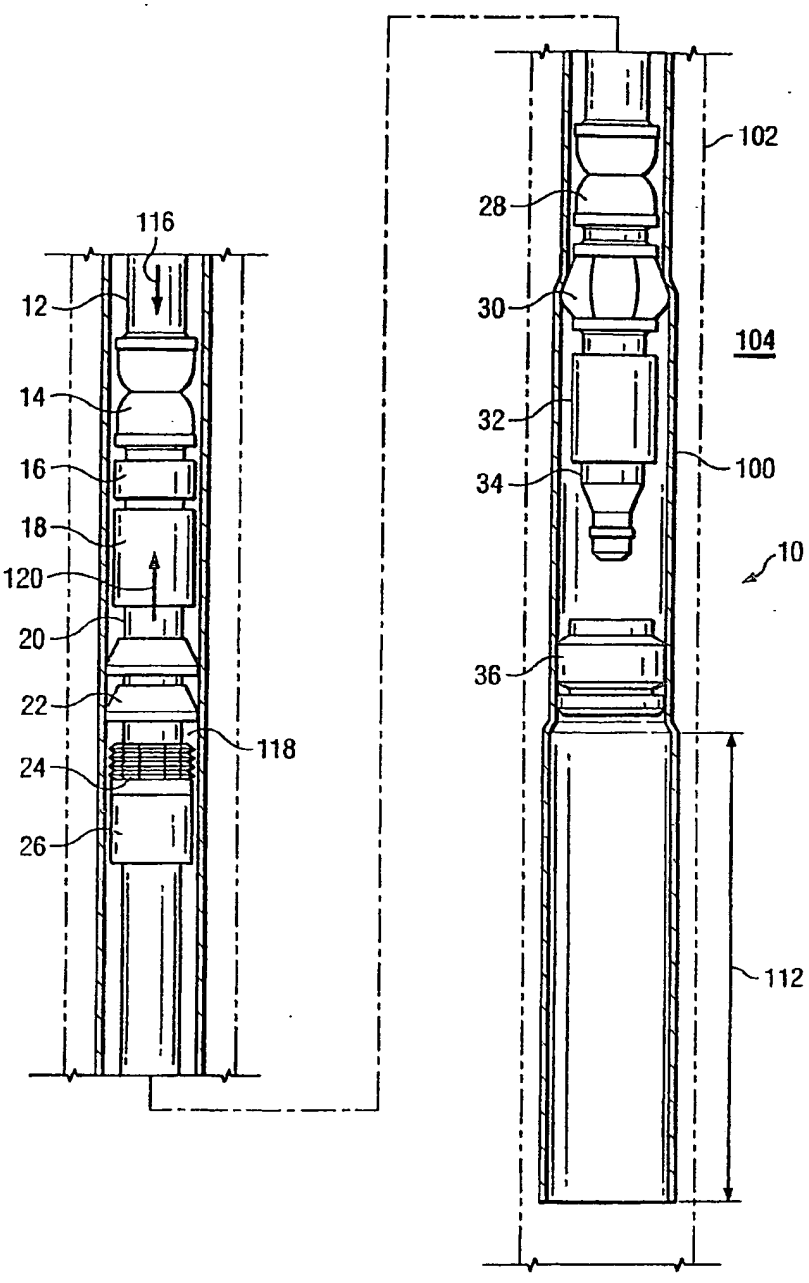
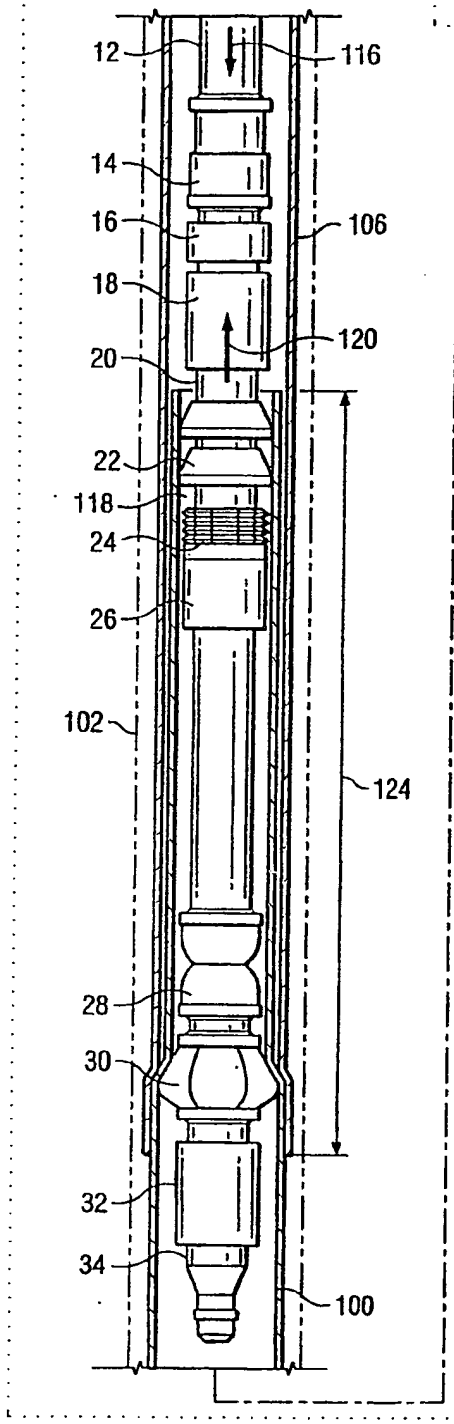


Fig. 7



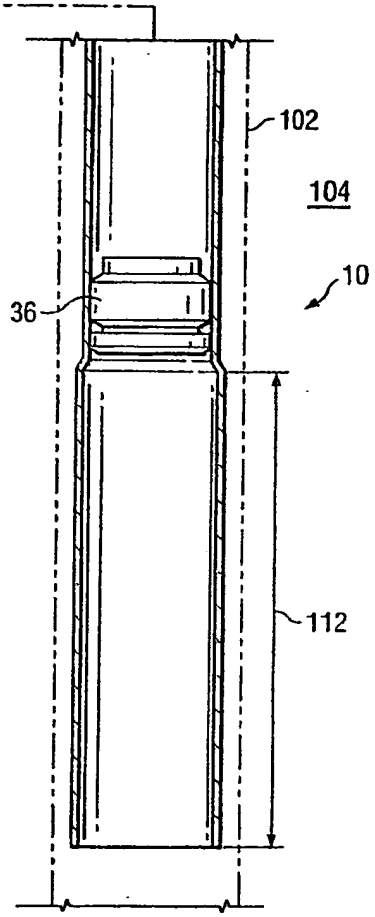


Fig. 8

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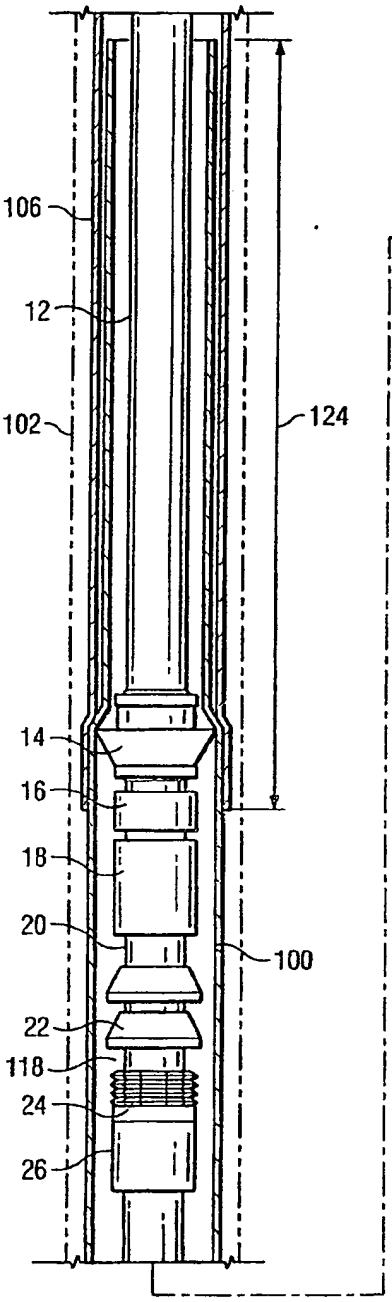

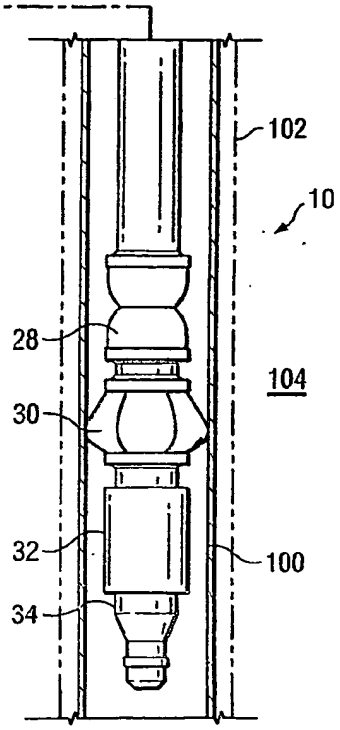

Fig. 9

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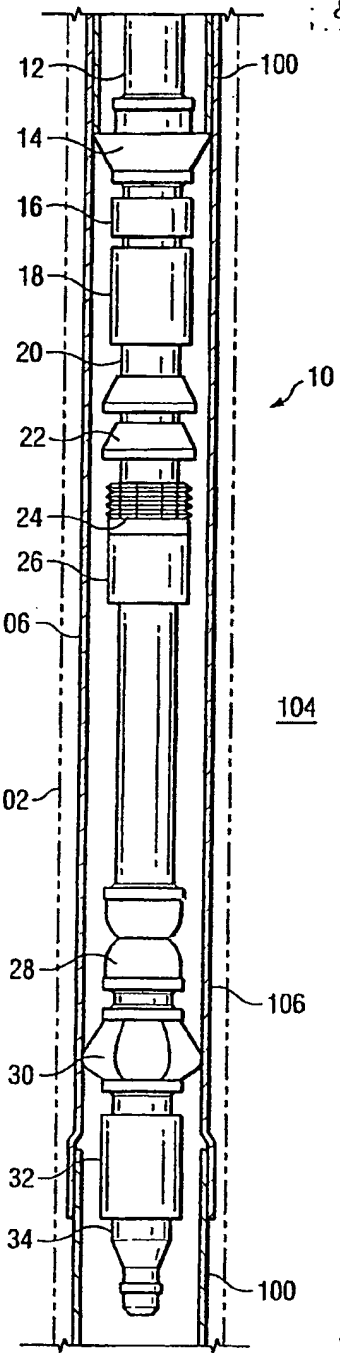

Fig. 10

DELIVERY OF FINAL

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Fig. 11-1

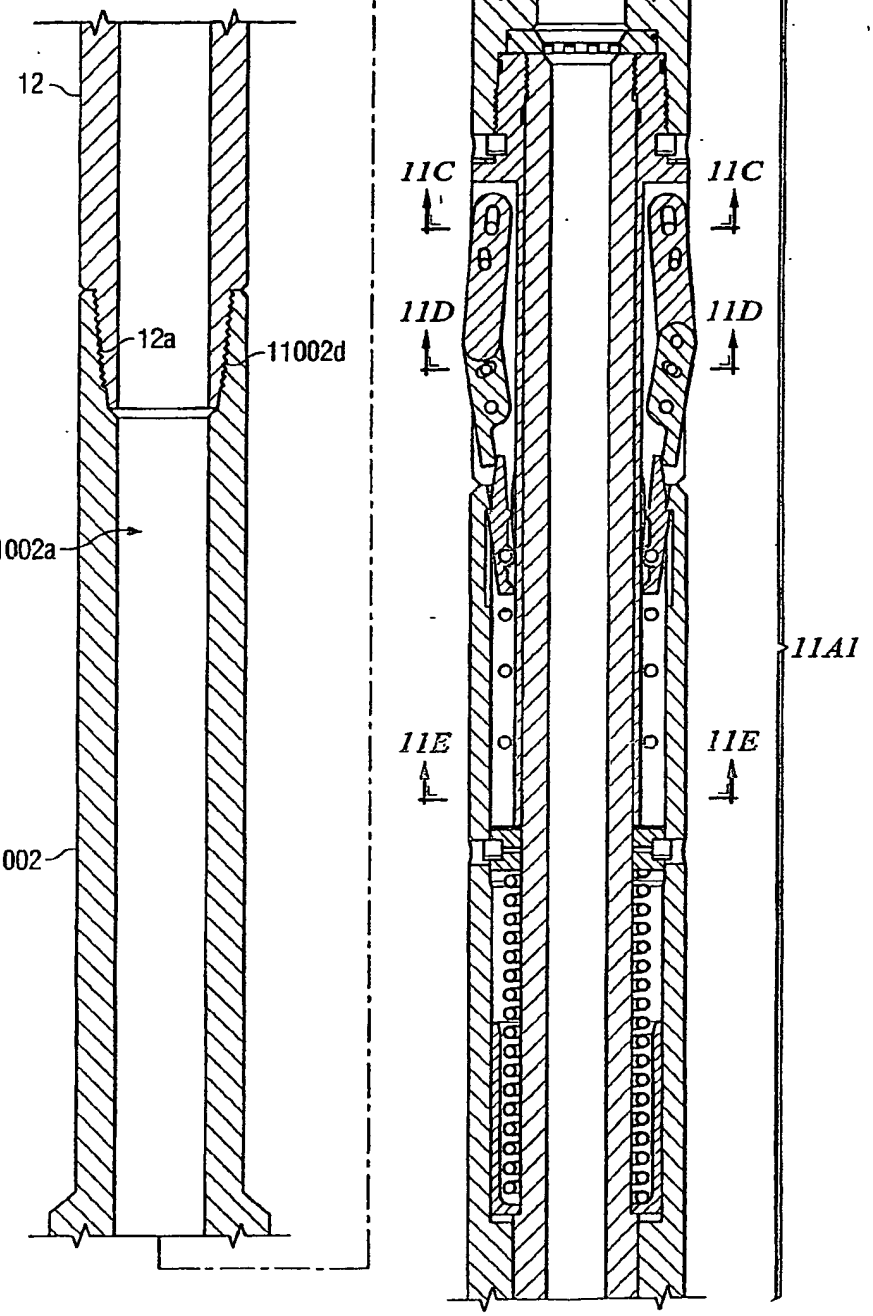

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Fig. 11-2

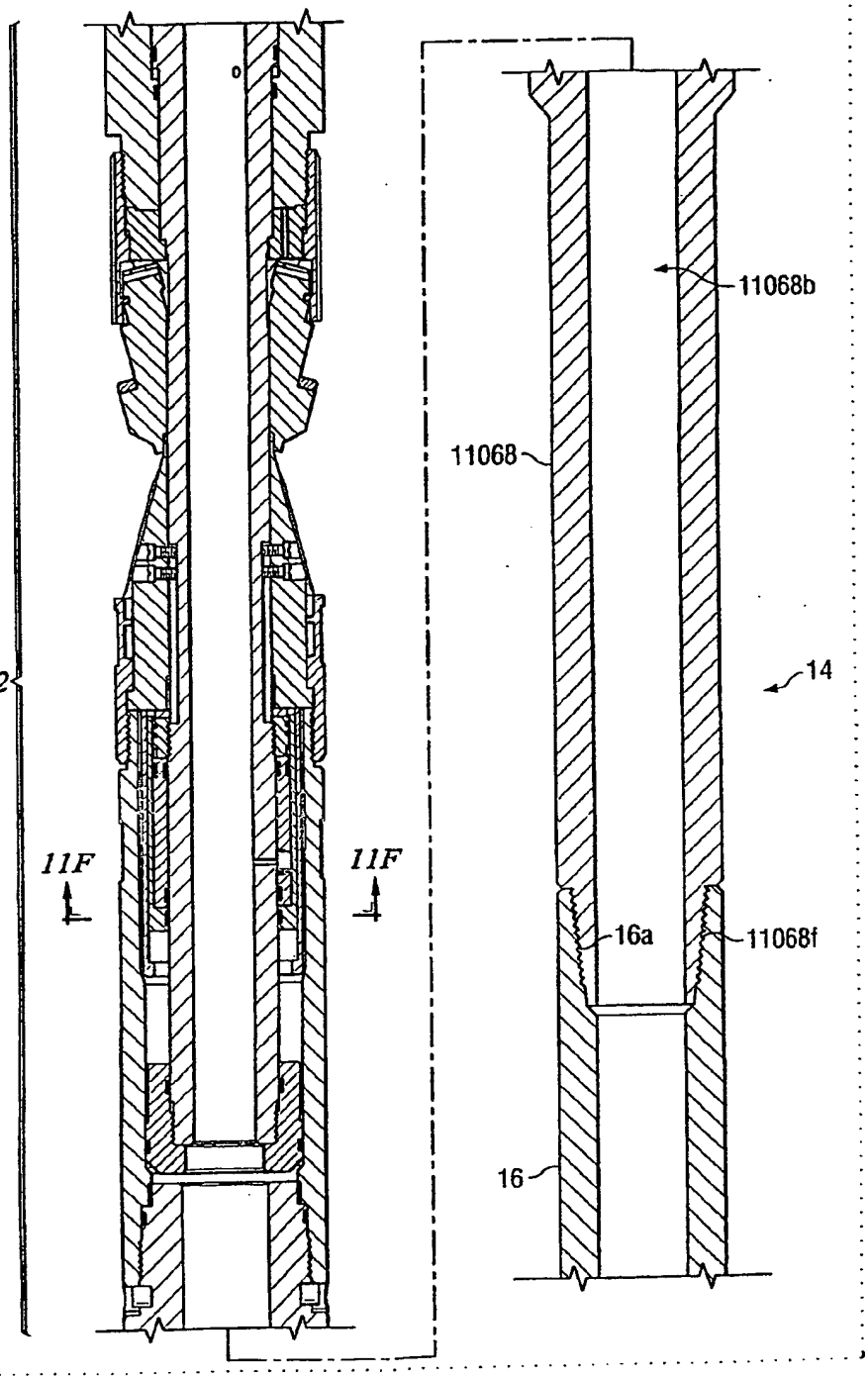

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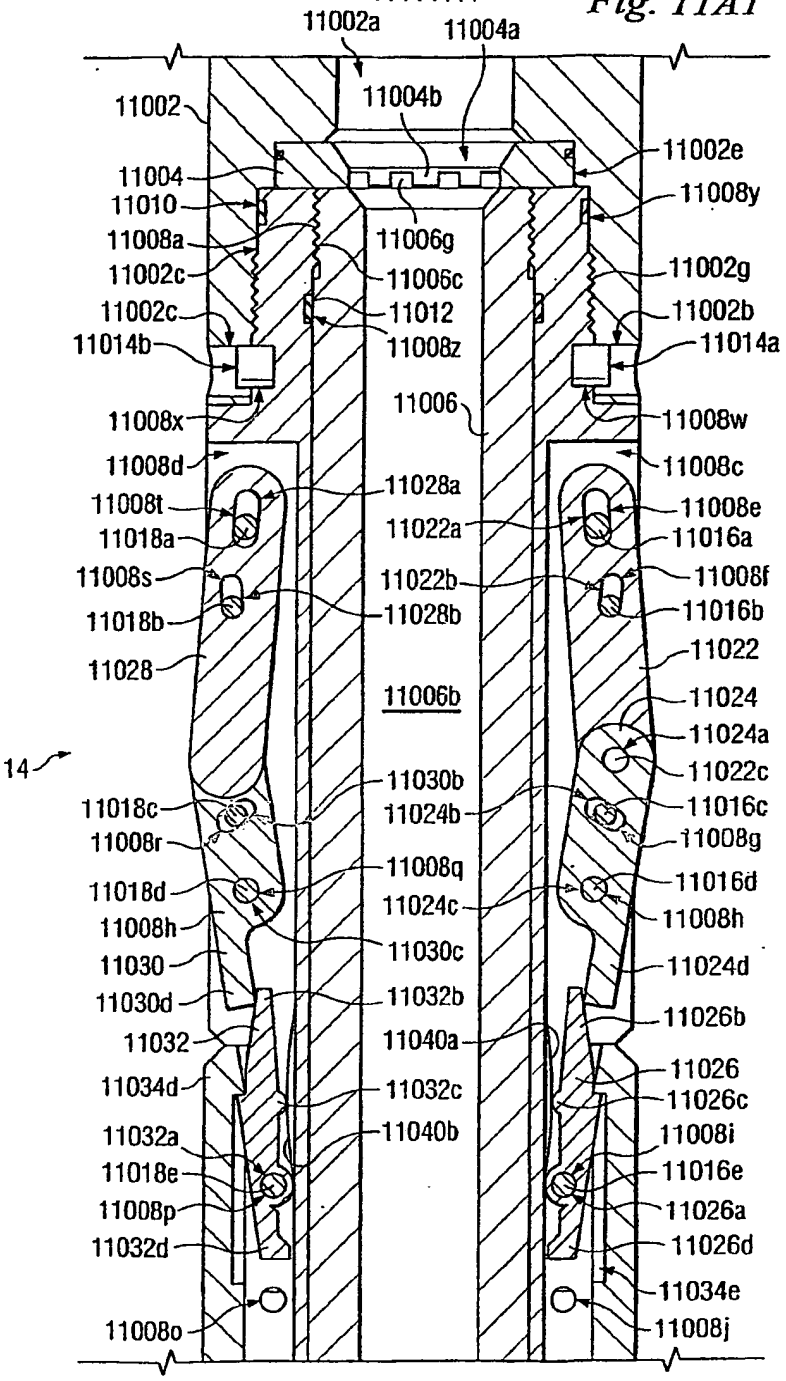
Fig. 11A1



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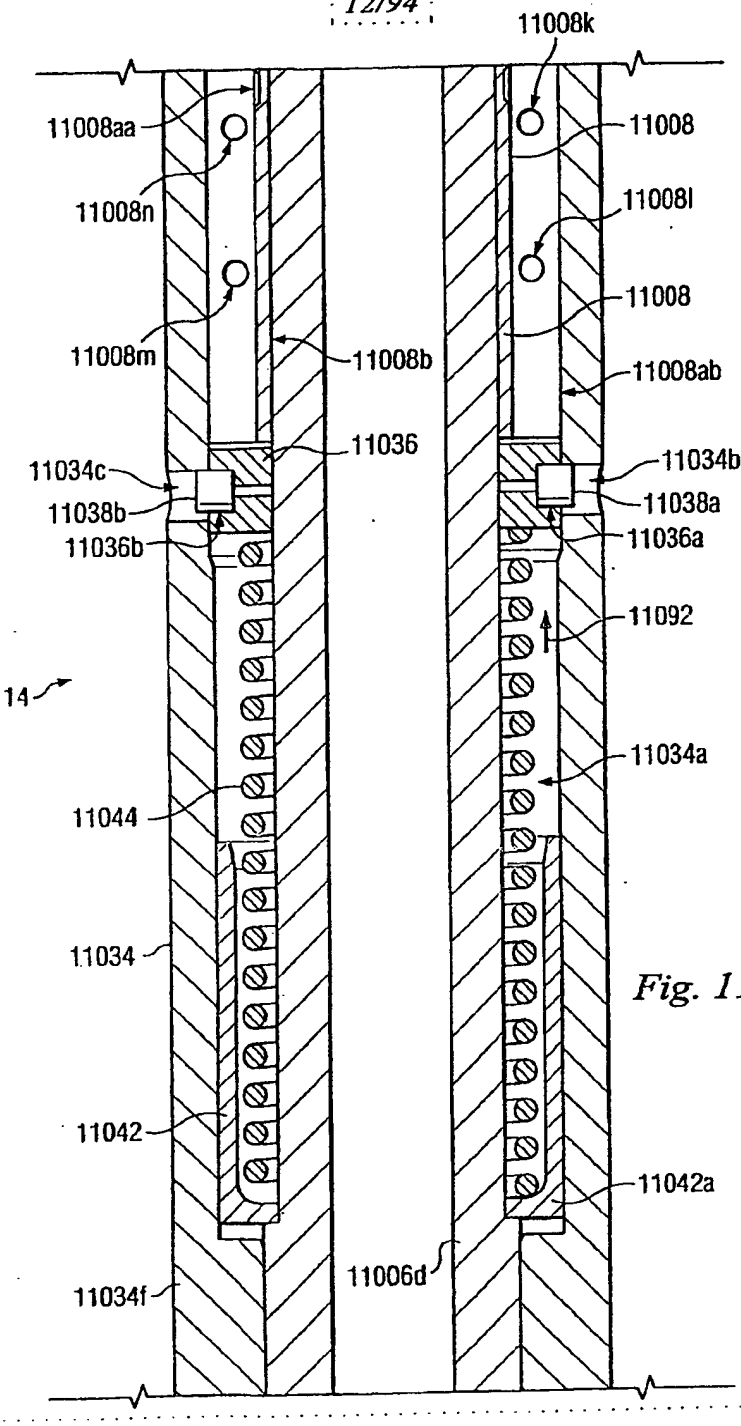

Fig. 11A2

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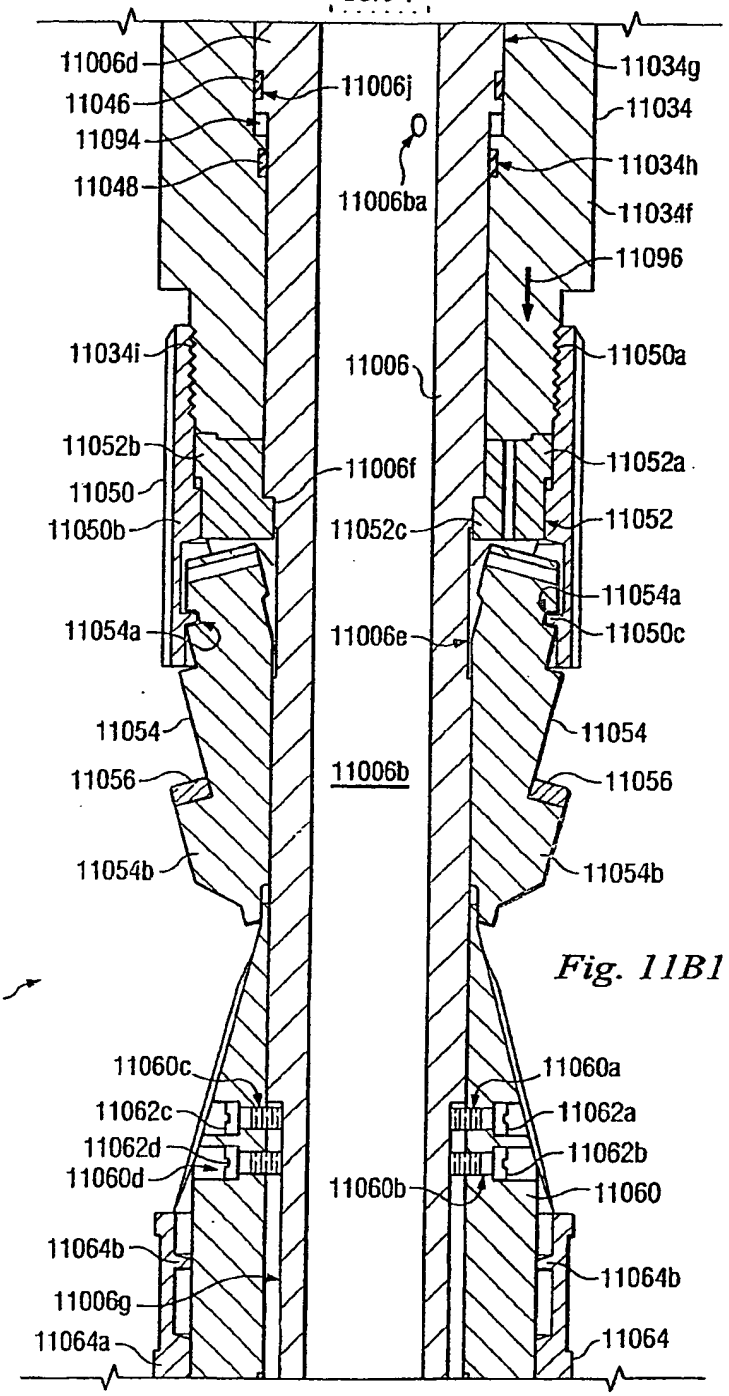

Fig. 11B1

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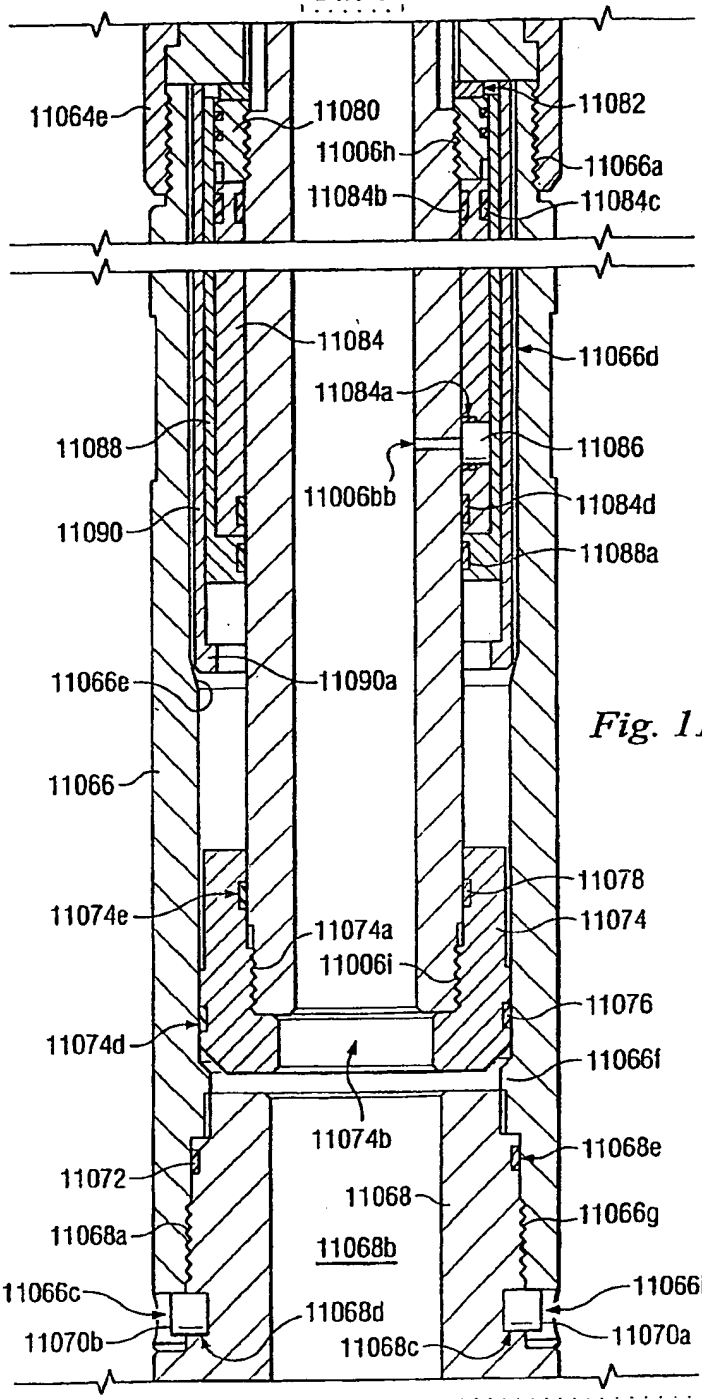

Fig. 11B2

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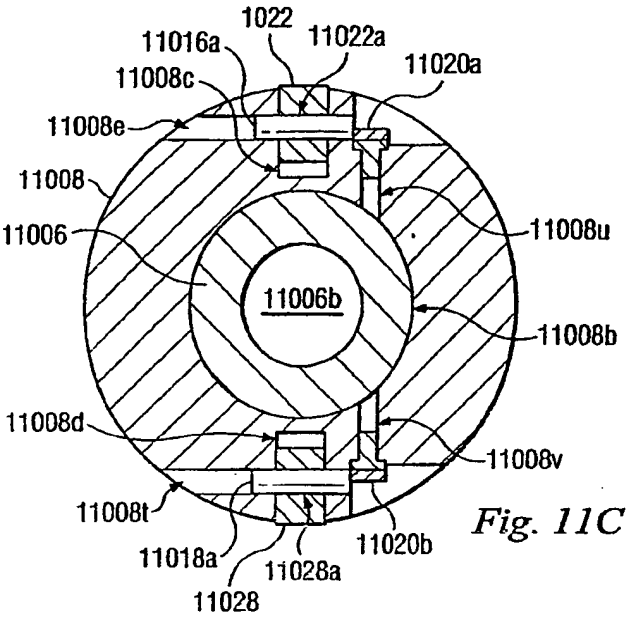

Fig. 11C

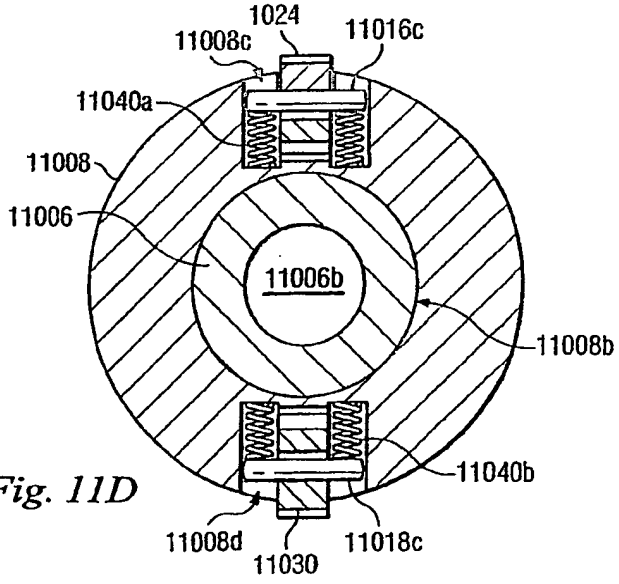

Fig. 11D

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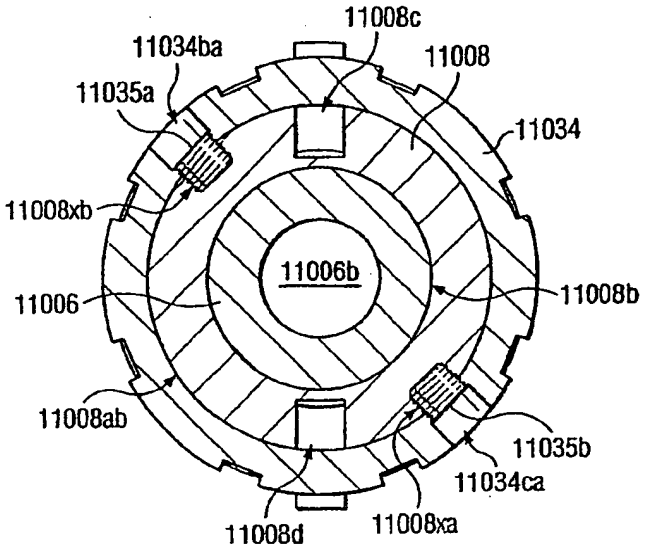

Fig. 11E

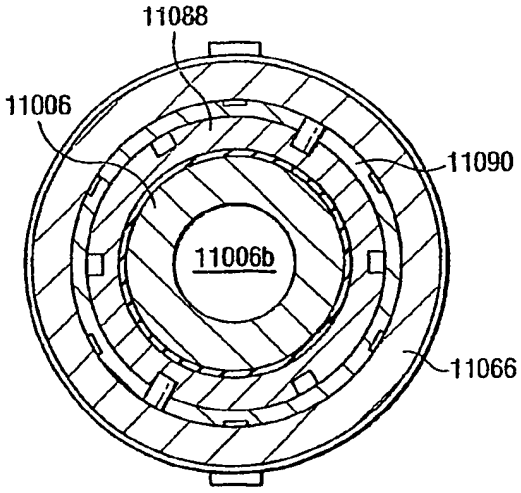

Fig. 11F

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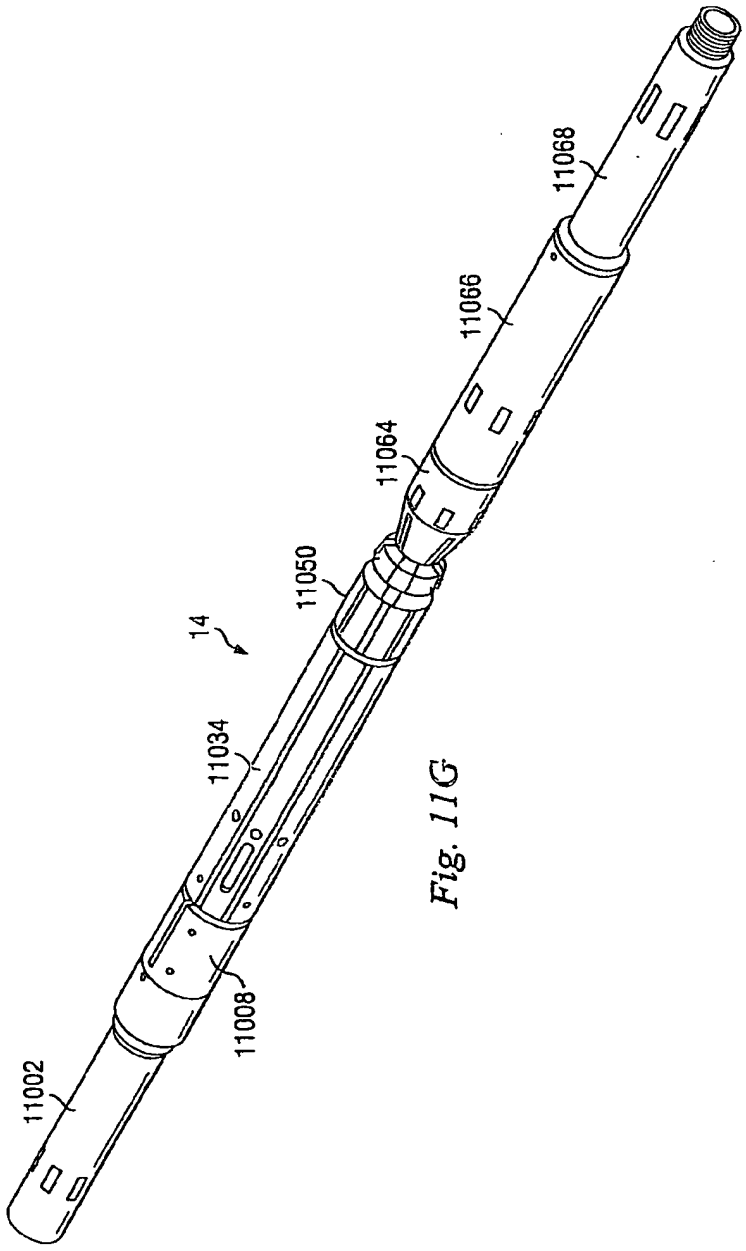

Fig. 11G

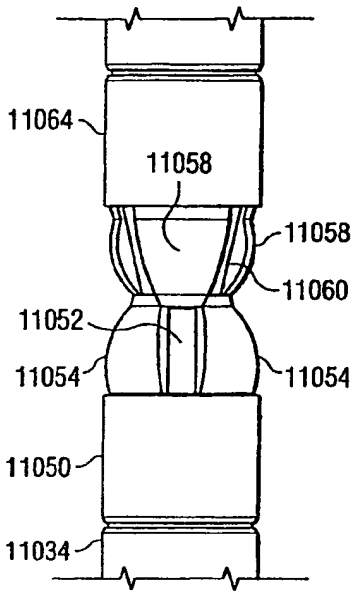

Fig. 11H

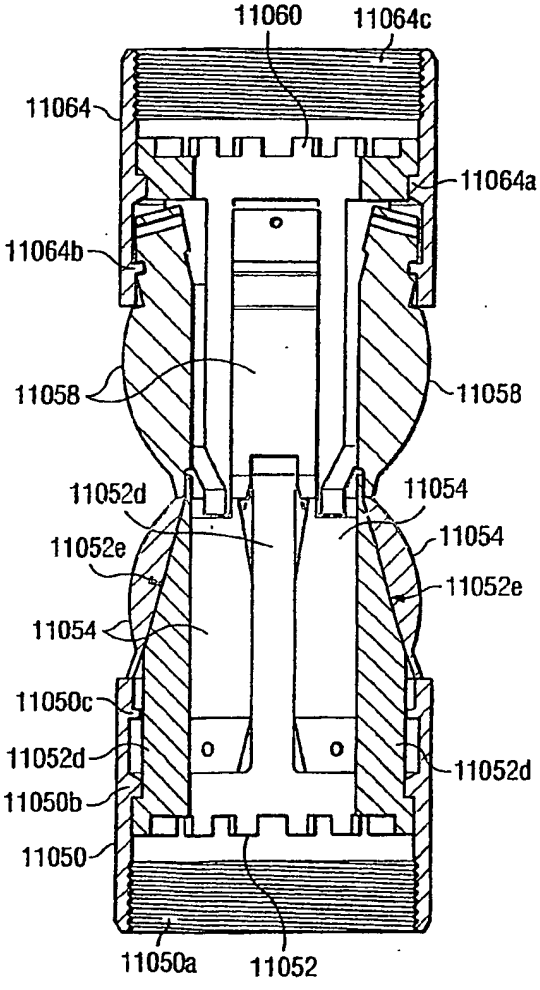

FIG. 11I

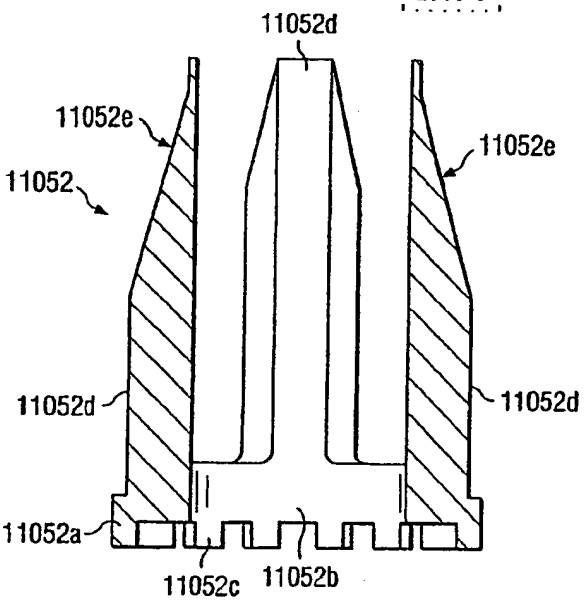

Fig. 11J

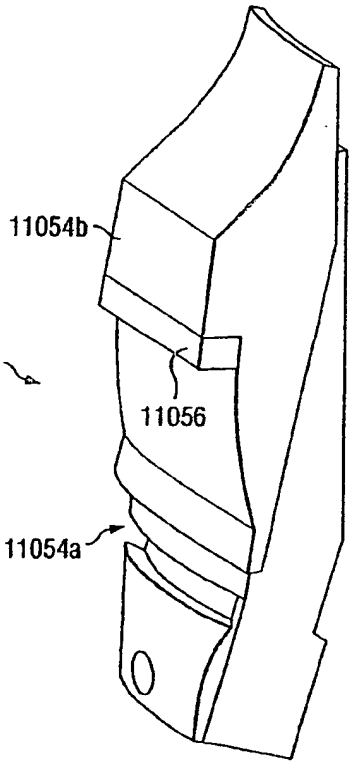

Fig. 11K

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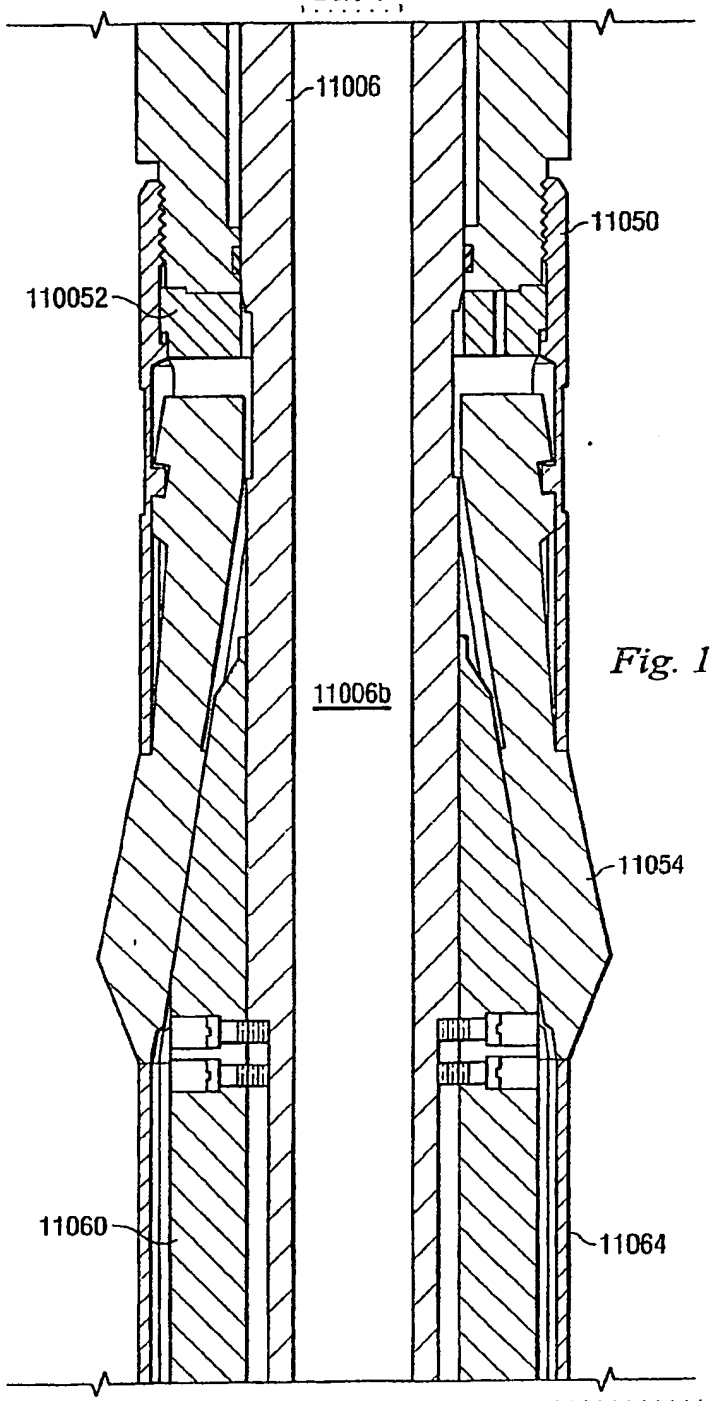

Fig. 11L

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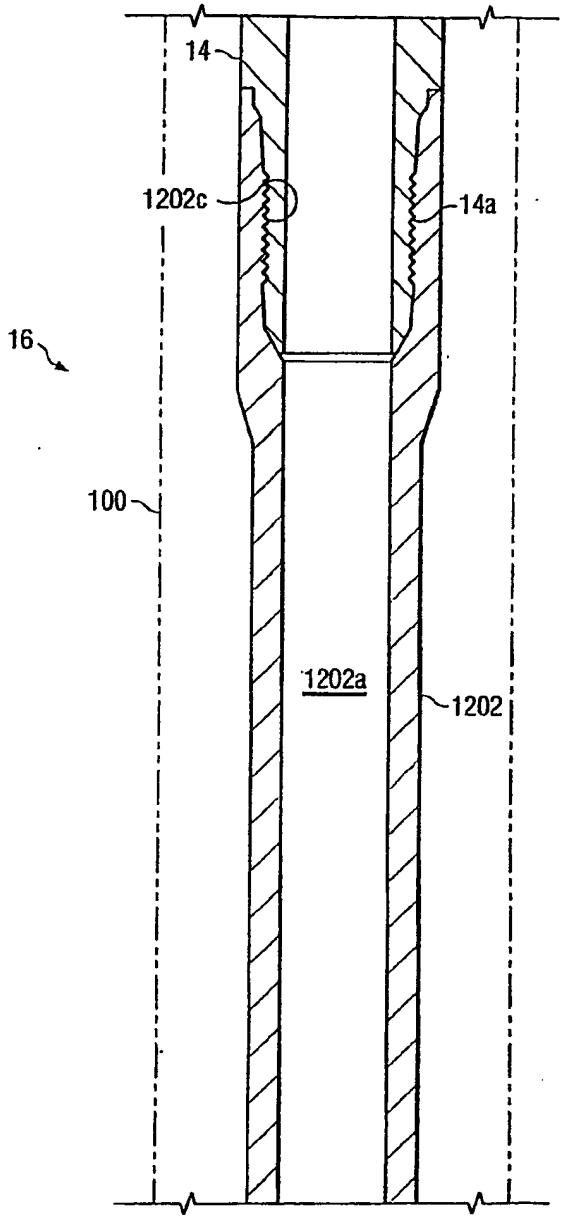

Fig. 12A1

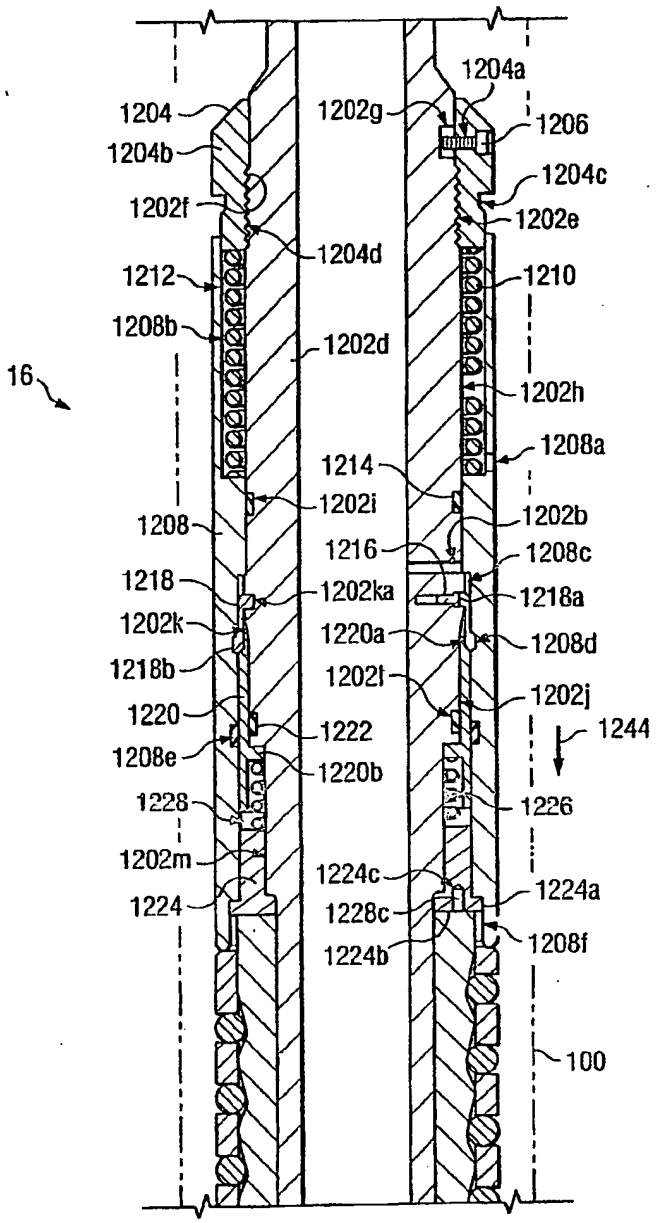

Fig. 12A2

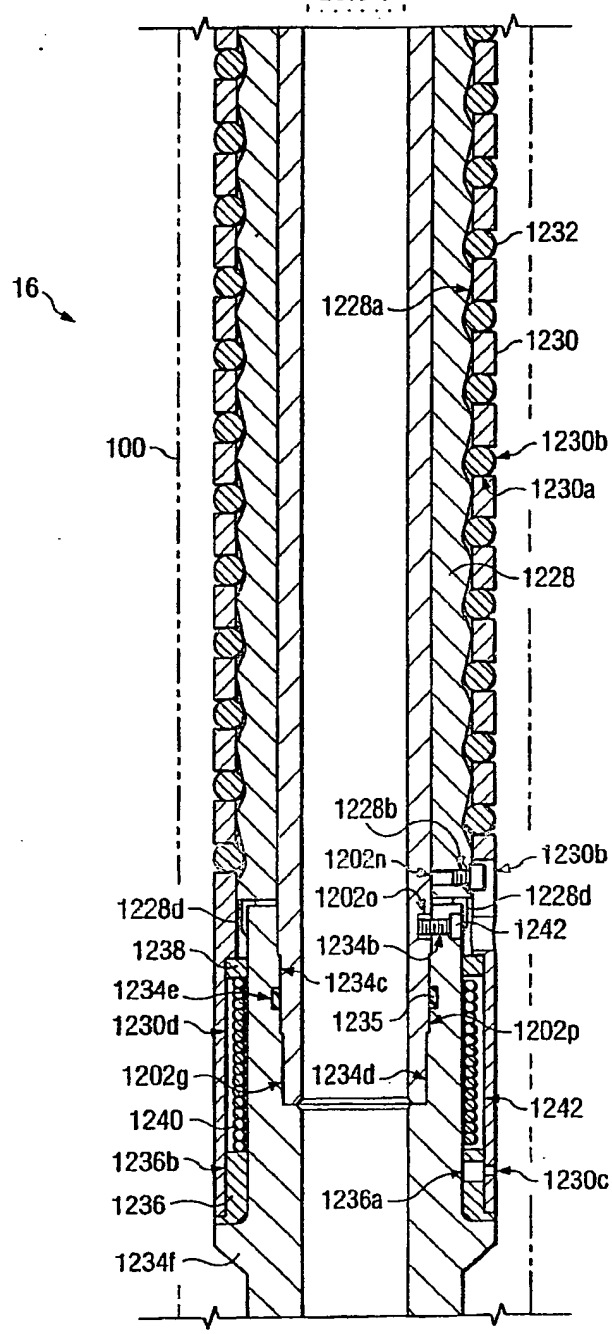

Fig. 12A3

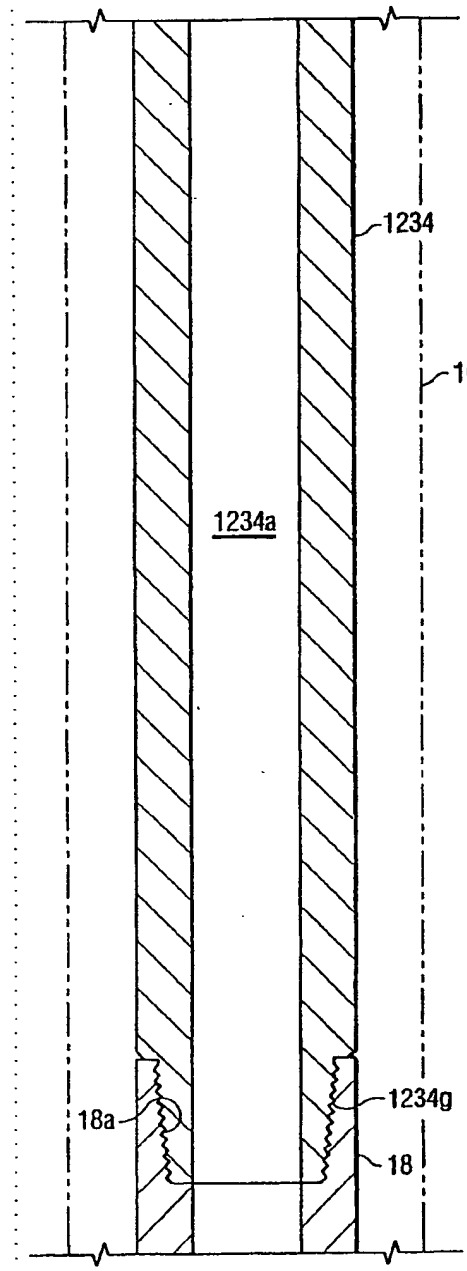

Fig. 12A4

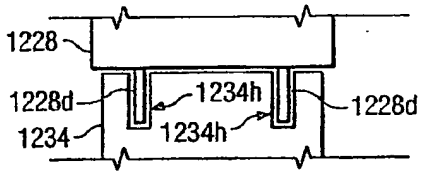

Fig. 12B

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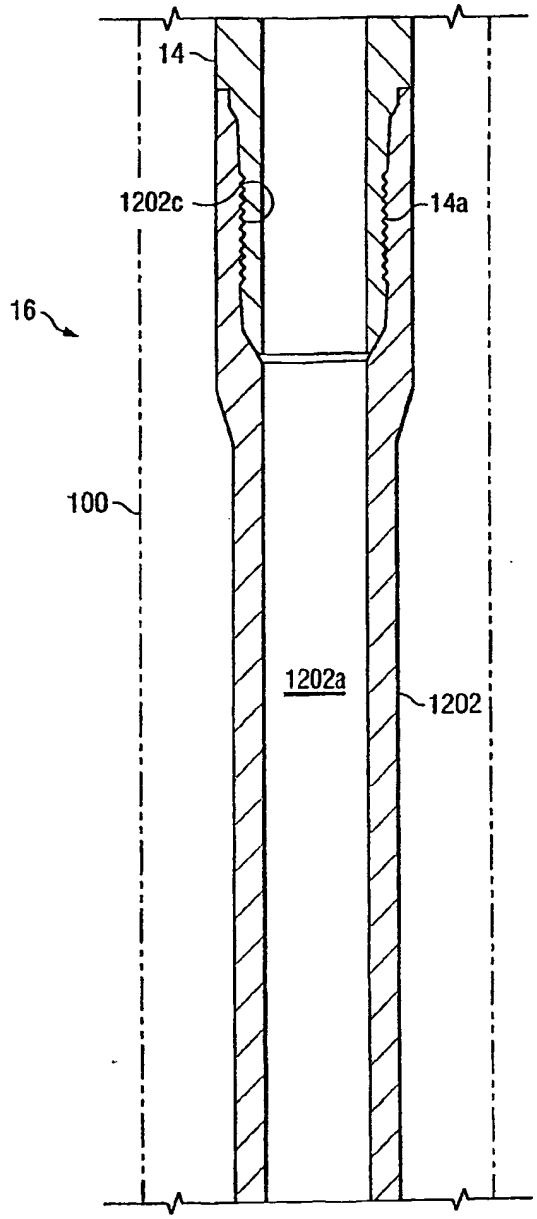

Fig. 12C1

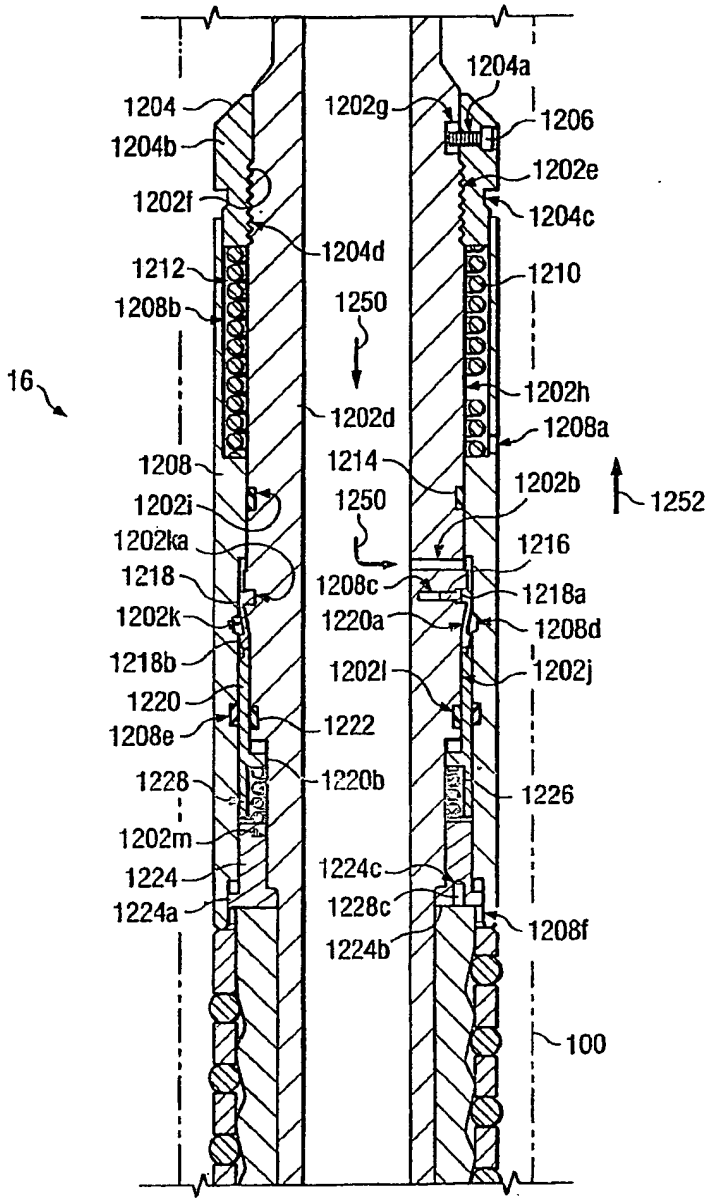

Fig. 12C2

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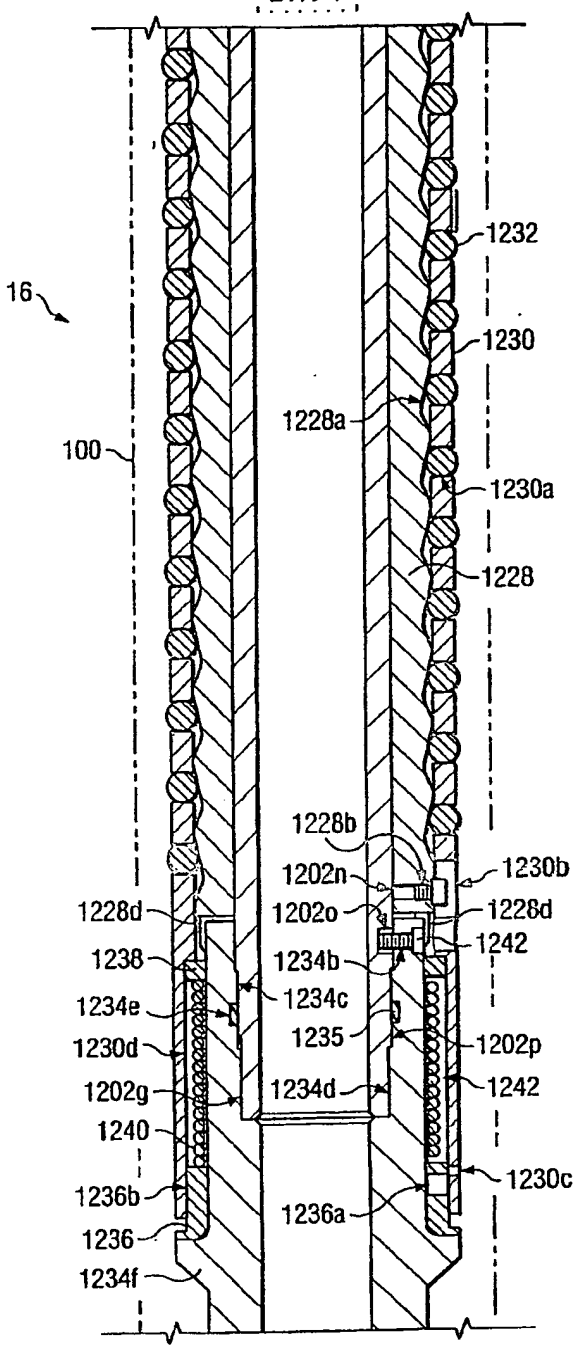

Fig. 12C3

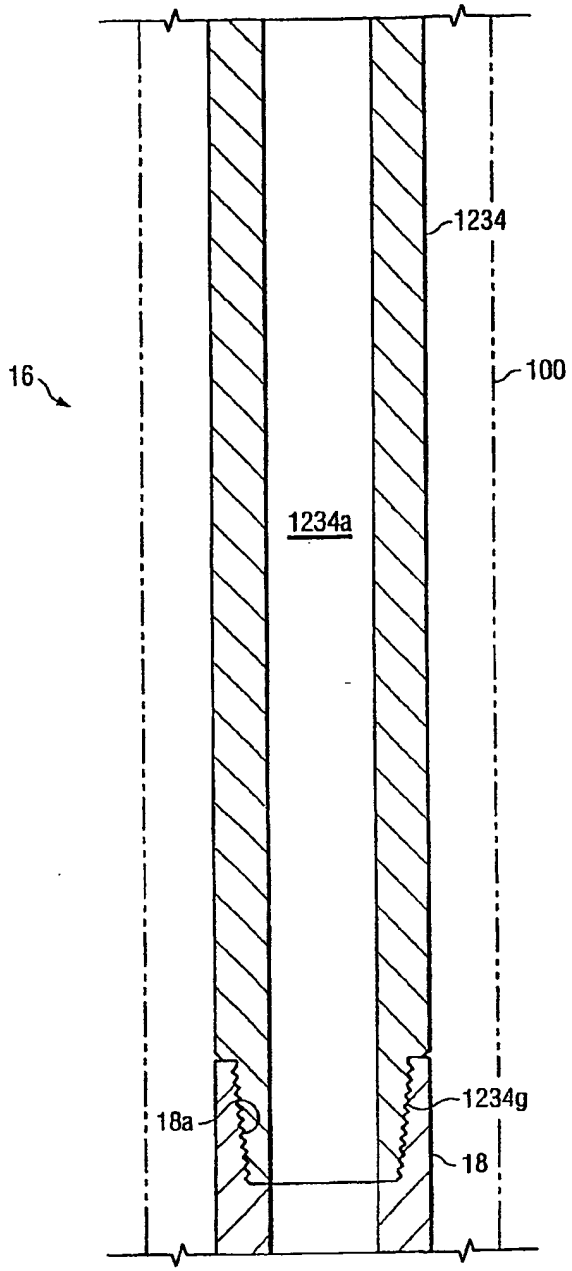

Fig. 12C4

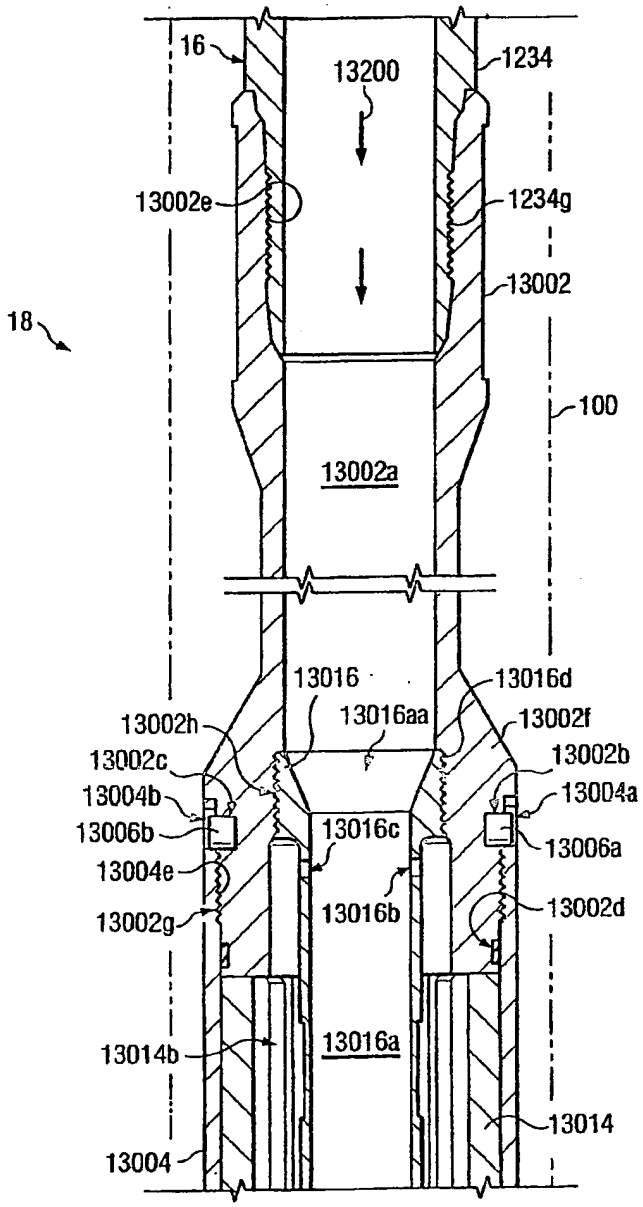

Fig. 13A1

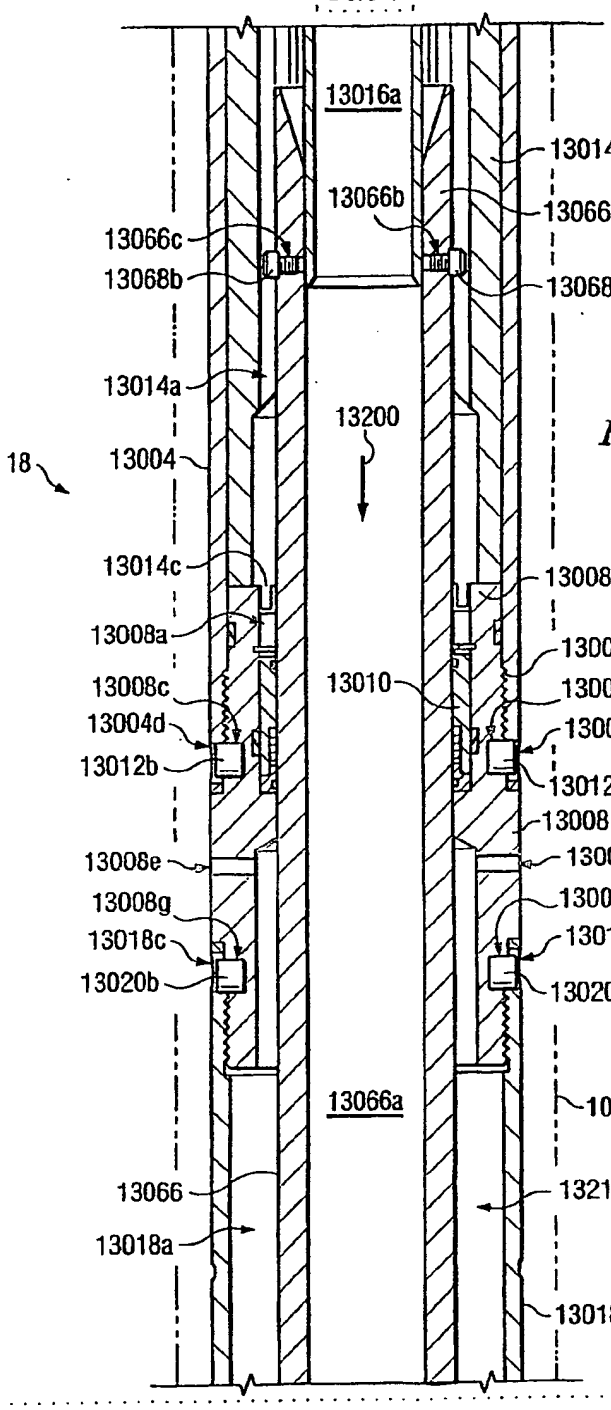

Fig. 13A2

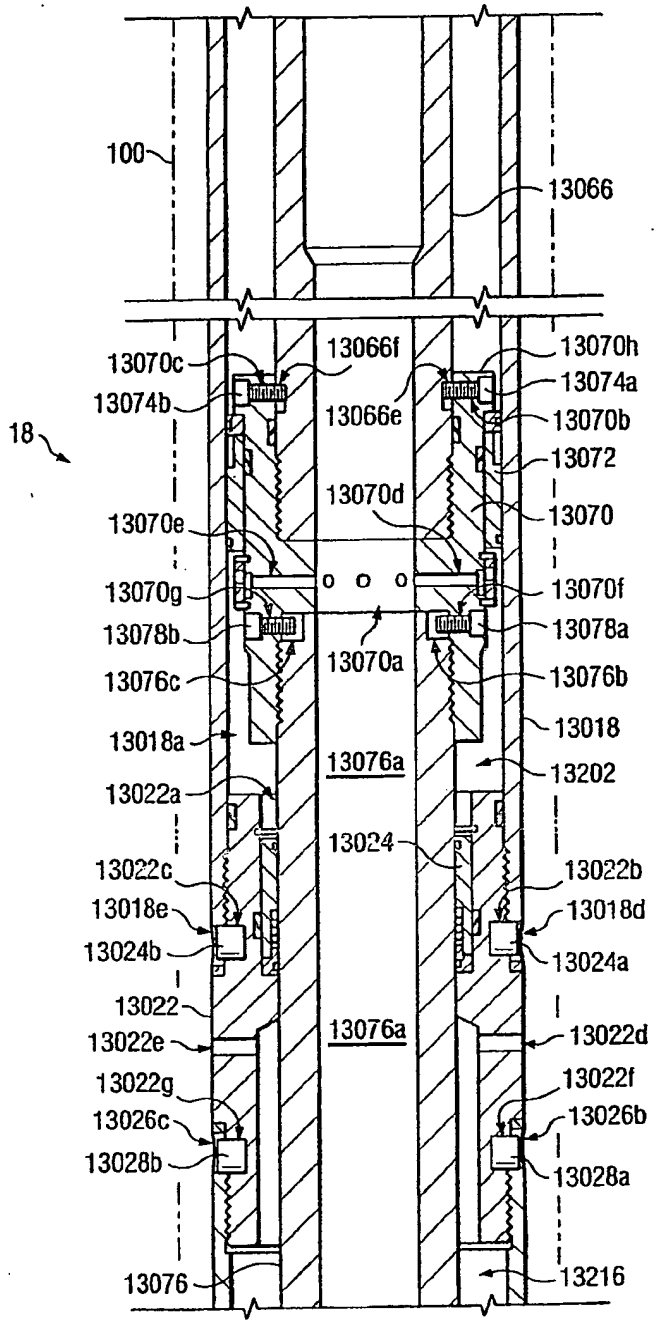
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Fig. 13A3

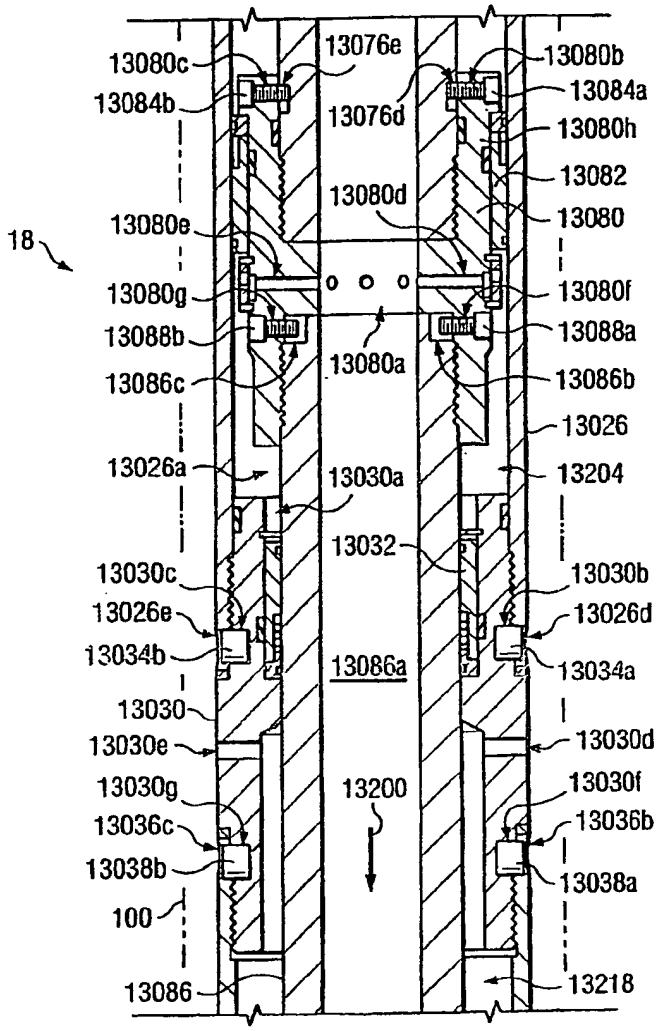
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Fig. 13A4

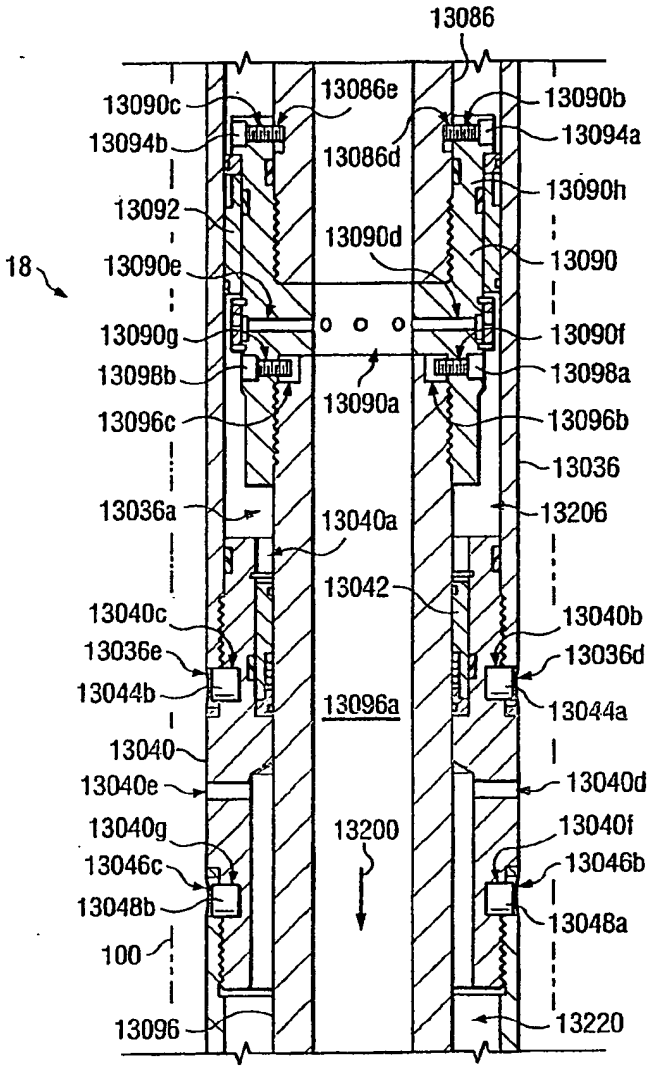
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Fig. 13A5

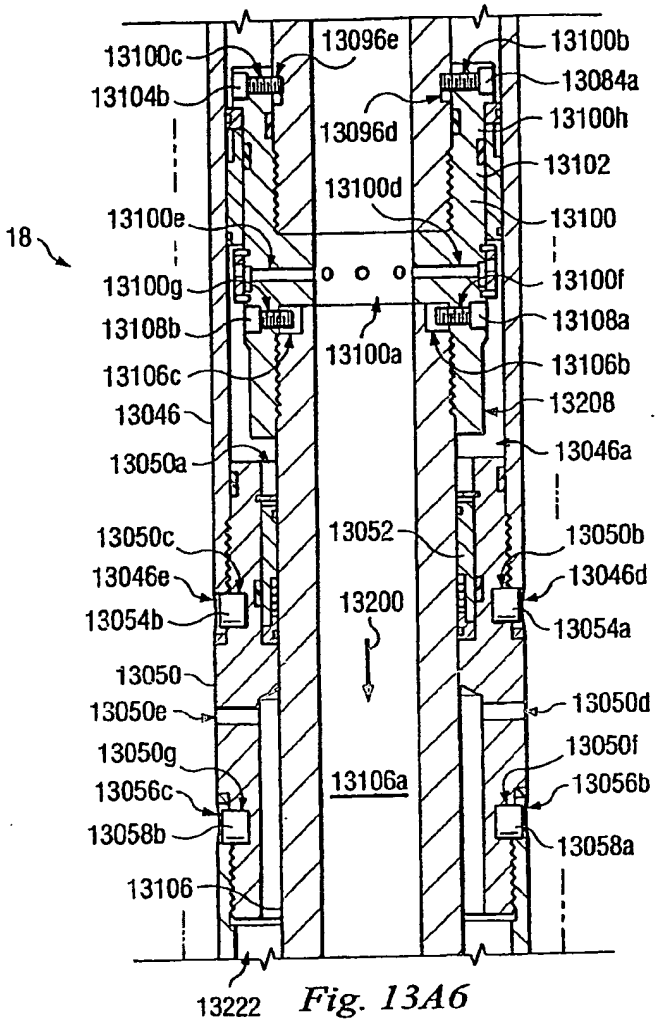
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Fig. 13A6

A4

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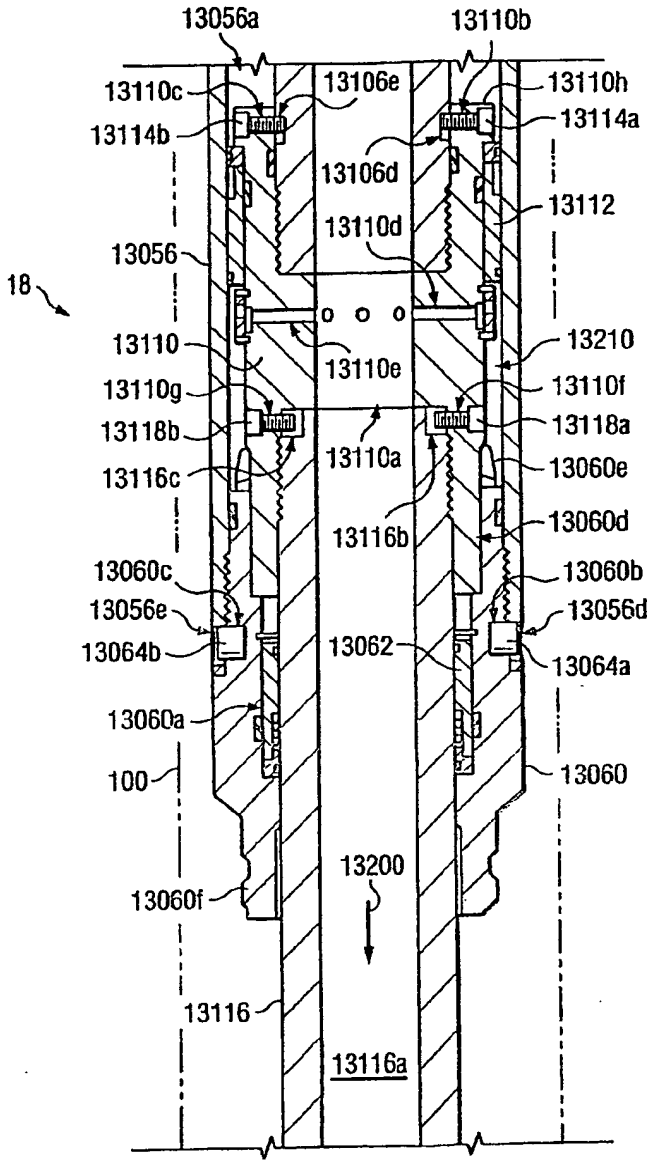
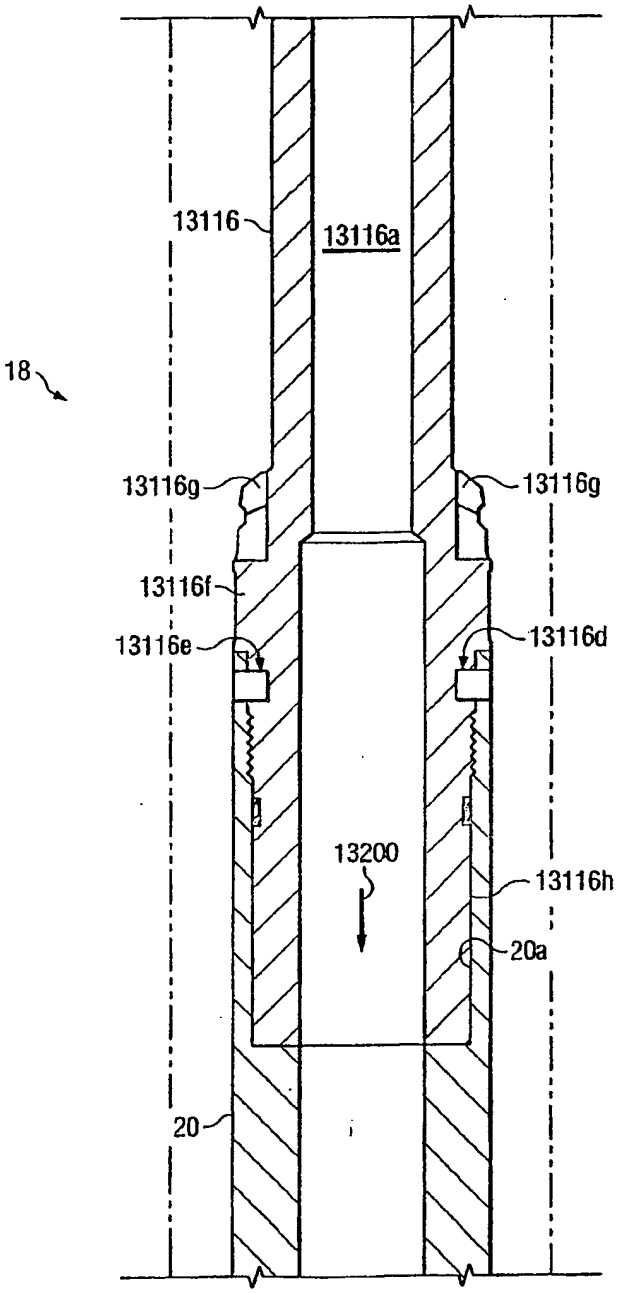


Fig. 13A7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13116h
20a
20

Fig. 13A8

25791.253

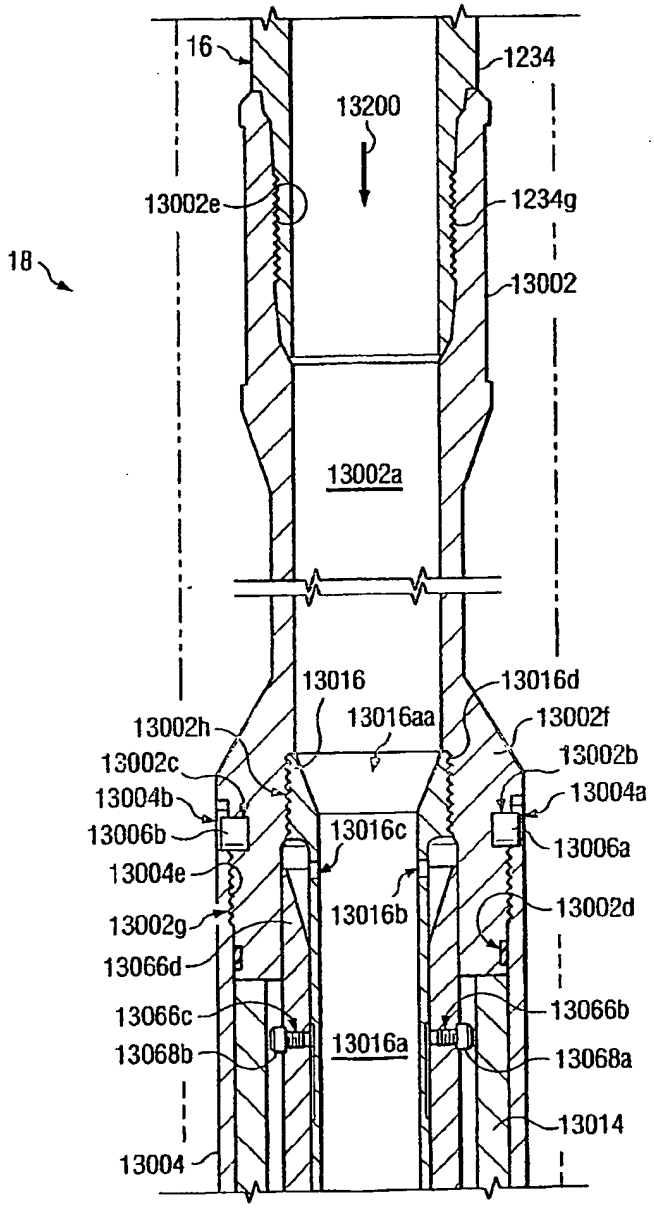
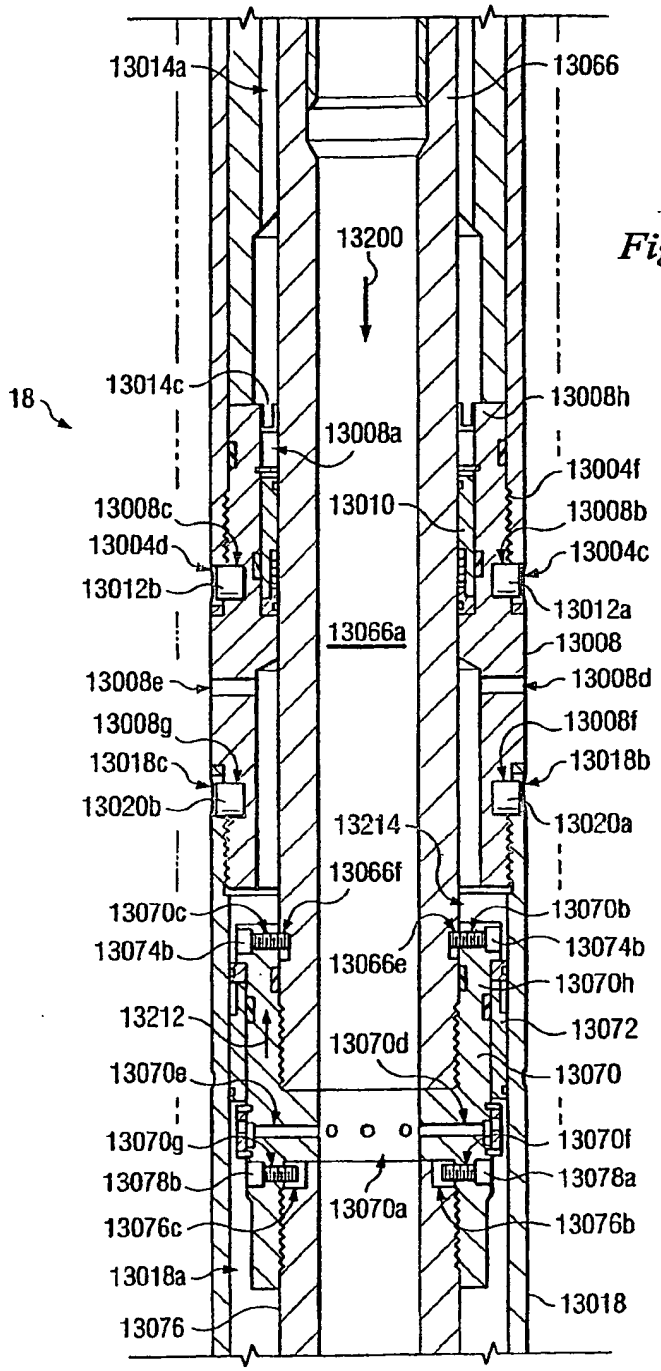


Fig. 13B1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13018b
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13070d
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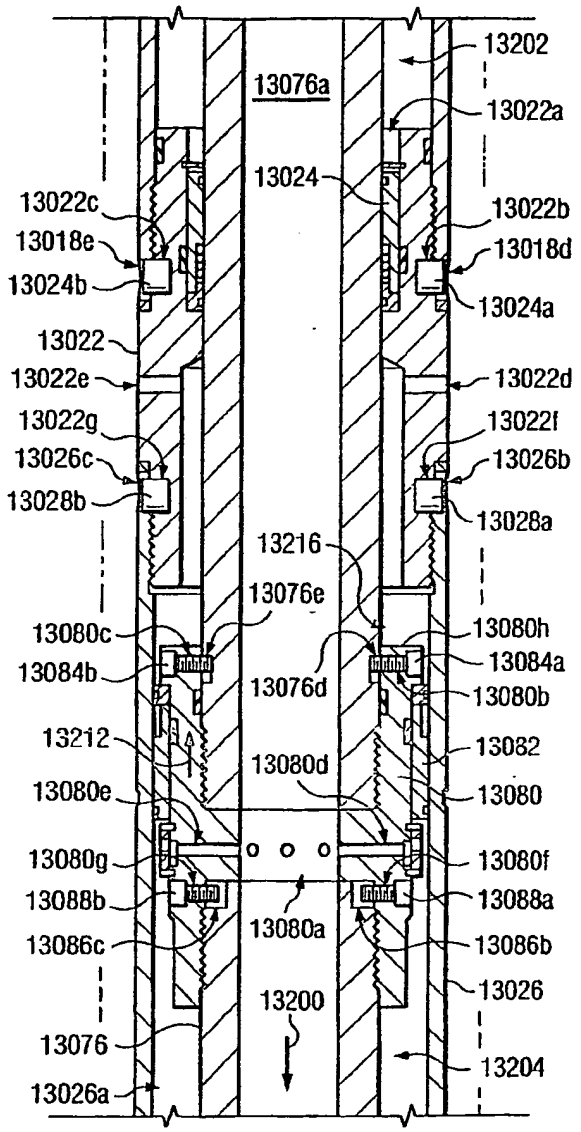
Fig. 13B2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13026c
13026b
13028b
13028a
13216
13076e
13080c
13080h
13084b
13084a
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13080e
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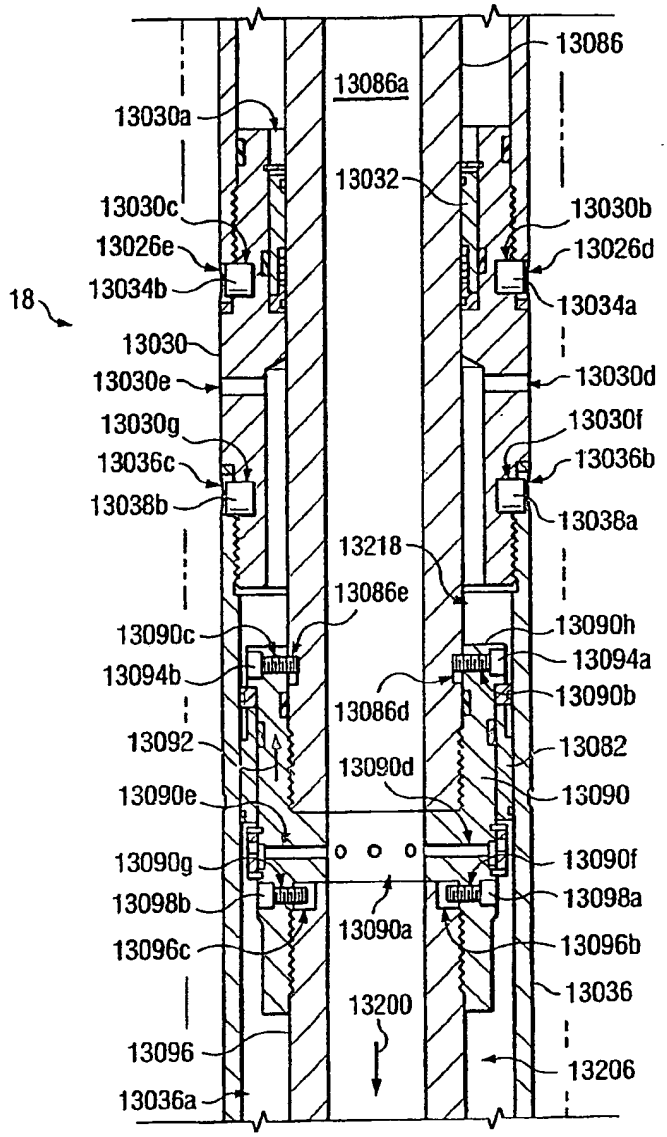
13026a

Fig. 13B3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13030g
13036b
13036c
13038b
13038a
13218
13086e
13090h
13090c
13094a
13094b
13090b
13086d
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13090d
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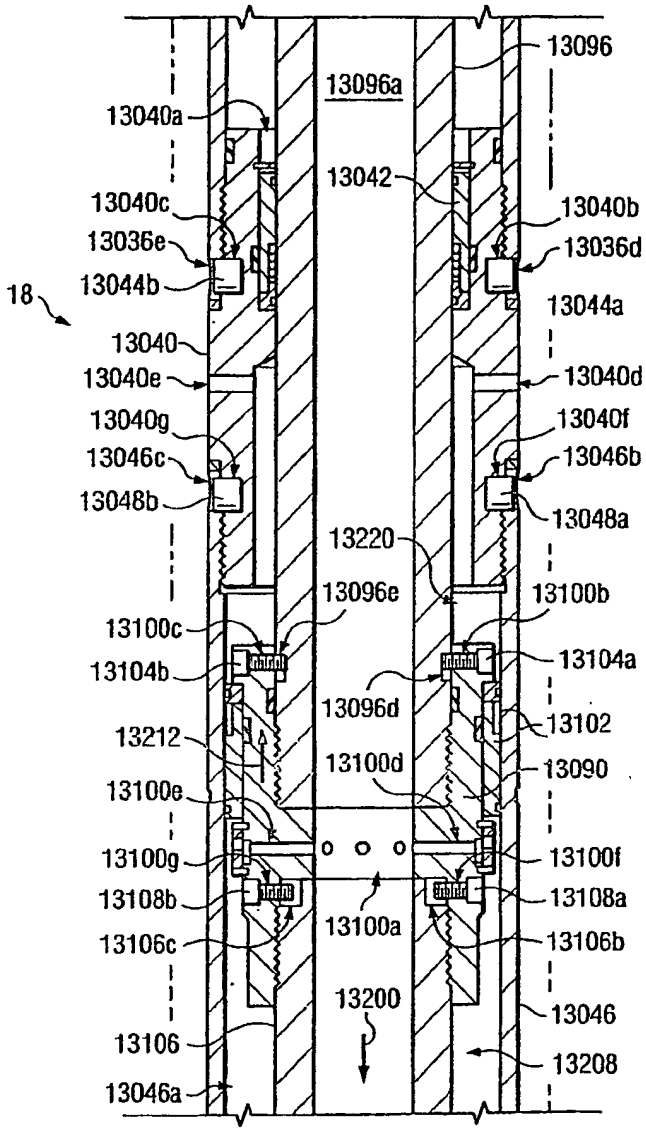
Fig. 13B4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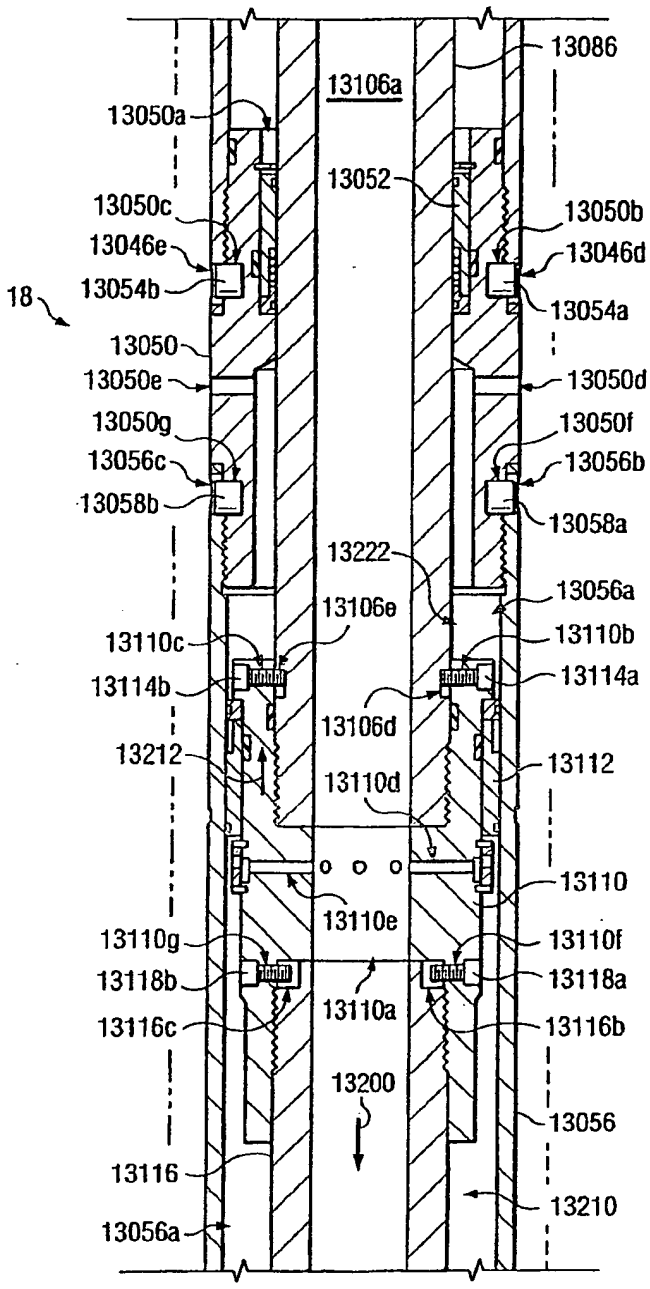
13046a

Fig. 13B5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13056c
13056b
13058b
13058a
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13110c
13110b
13114b
13114a
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13110d
13110
13110e
13110g
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13116
13210
13056a

Fig. 13B6

25791.253

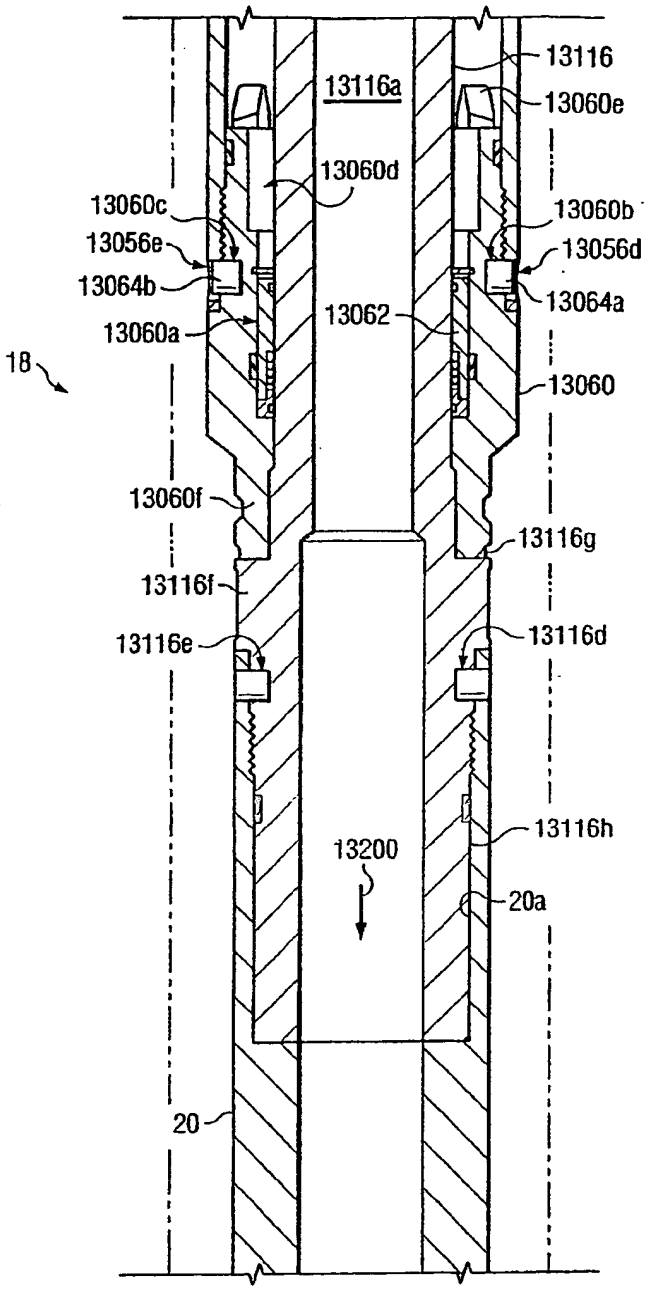
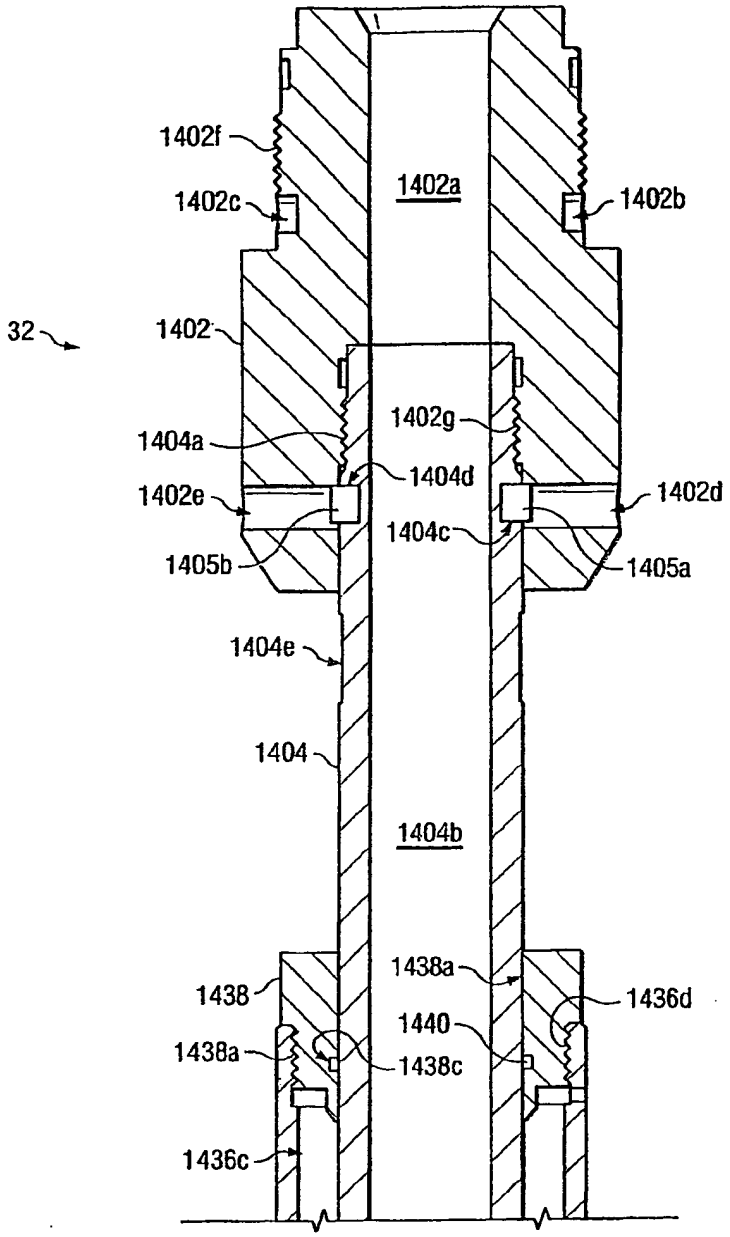


Fig. 13B7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1404c
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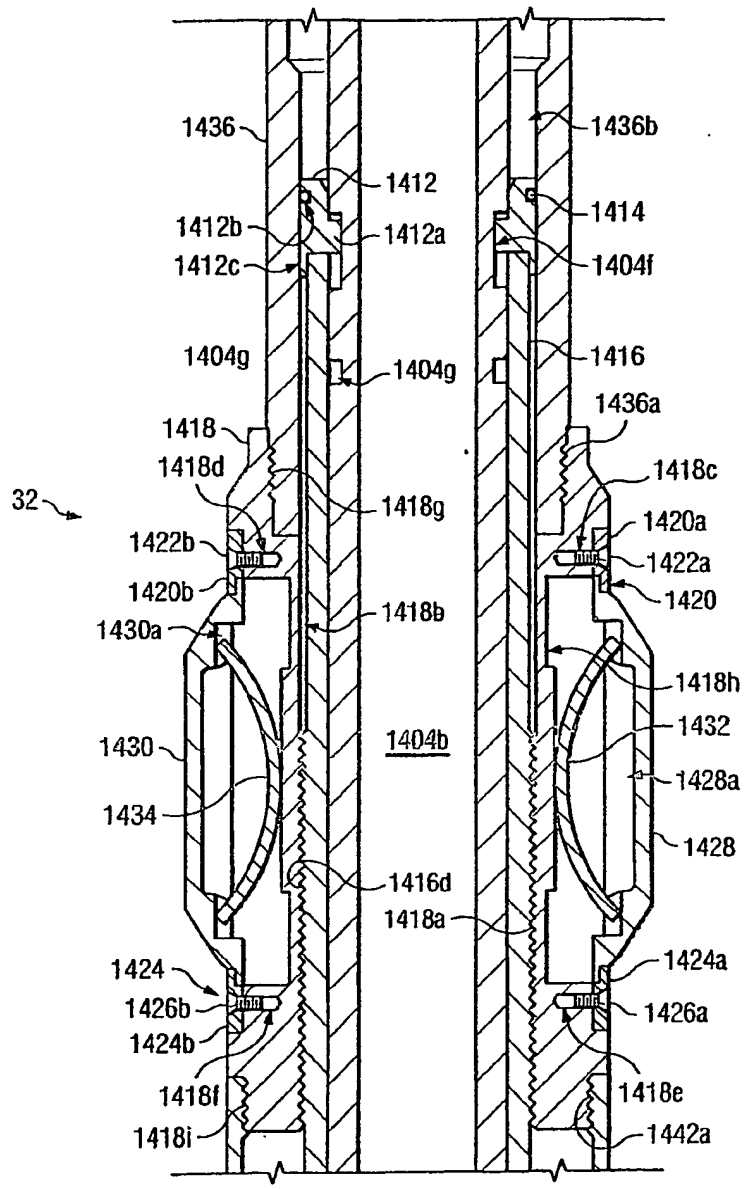
1438a
1438c
1436c

Fig. 14A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1404b
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1416d
1418a
1424
1426b
1424b
1418f
1418i
1436b
1414
1404f
1416
1436a
1418c
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1418e
1442a

Fig. 14B

25791.253

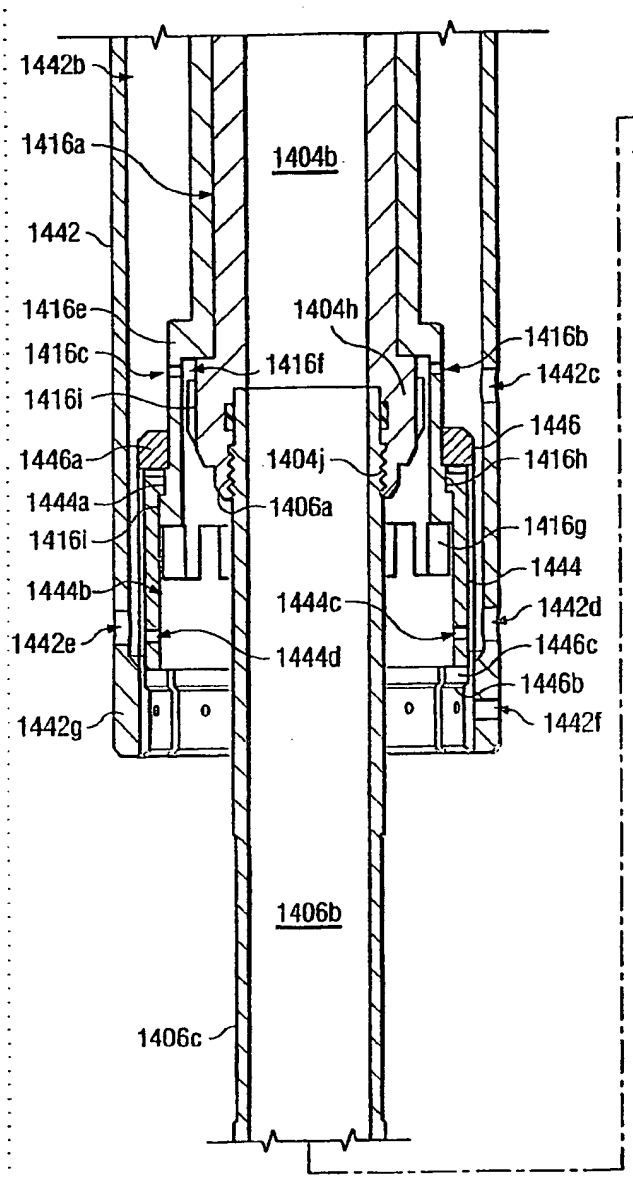

Fig. 14C

A4

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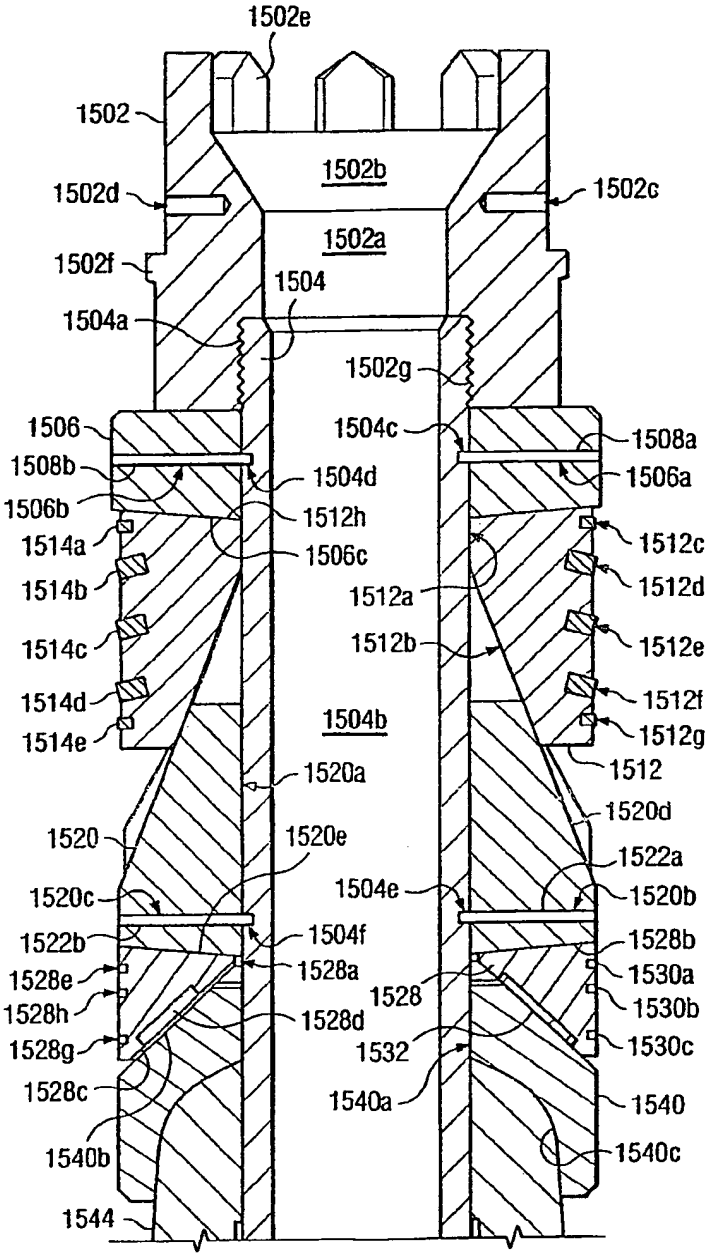

Fig. 15-1

A4

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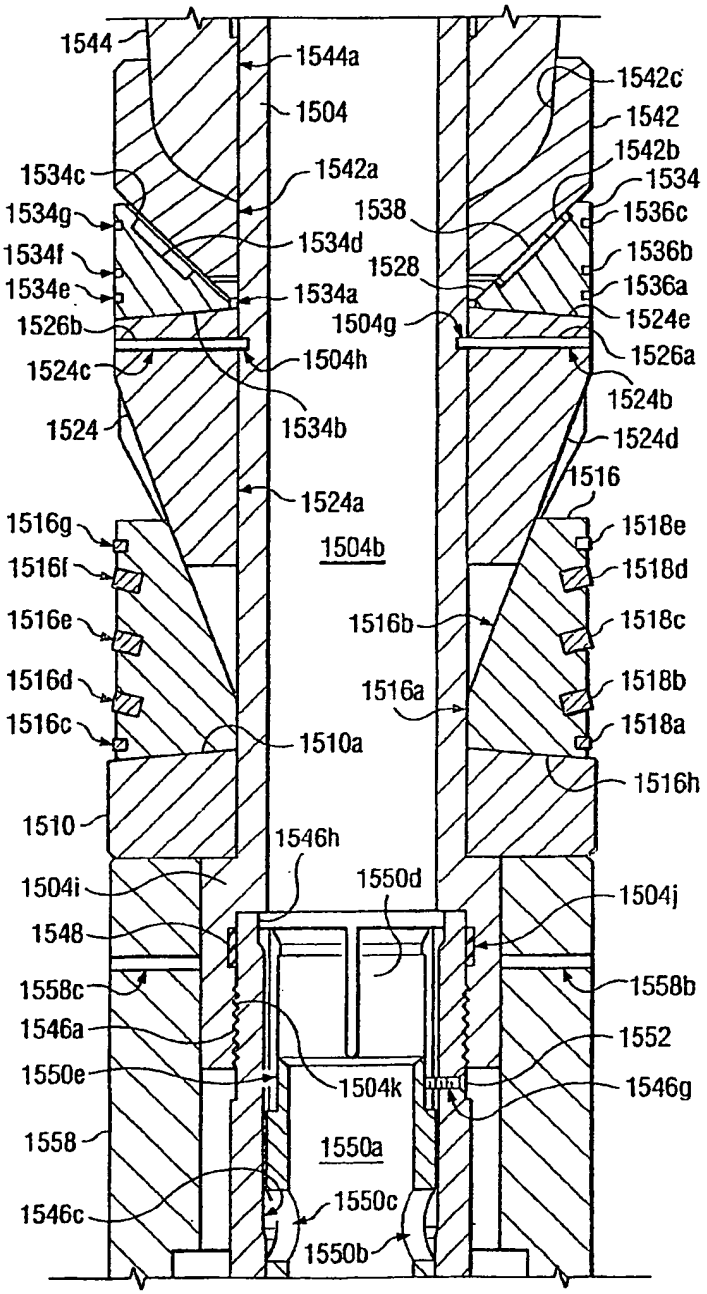

Fig. 15-2

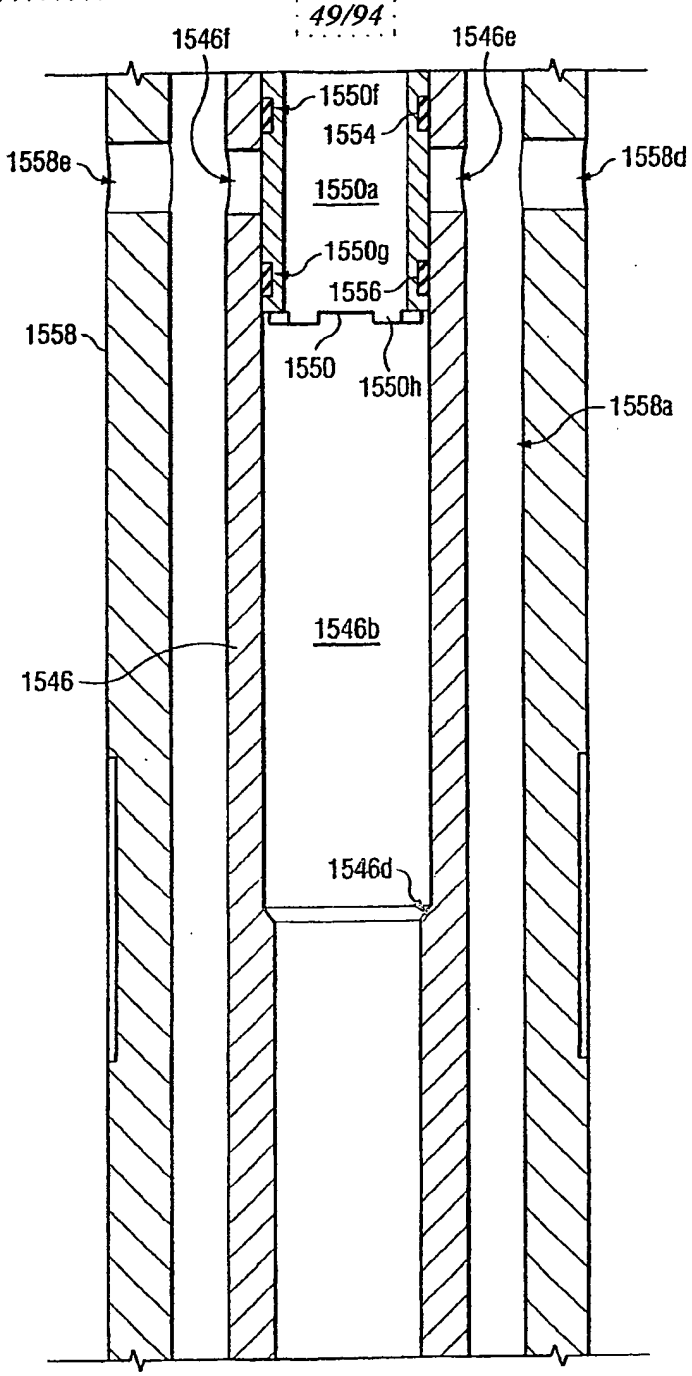

Fig. 15-3

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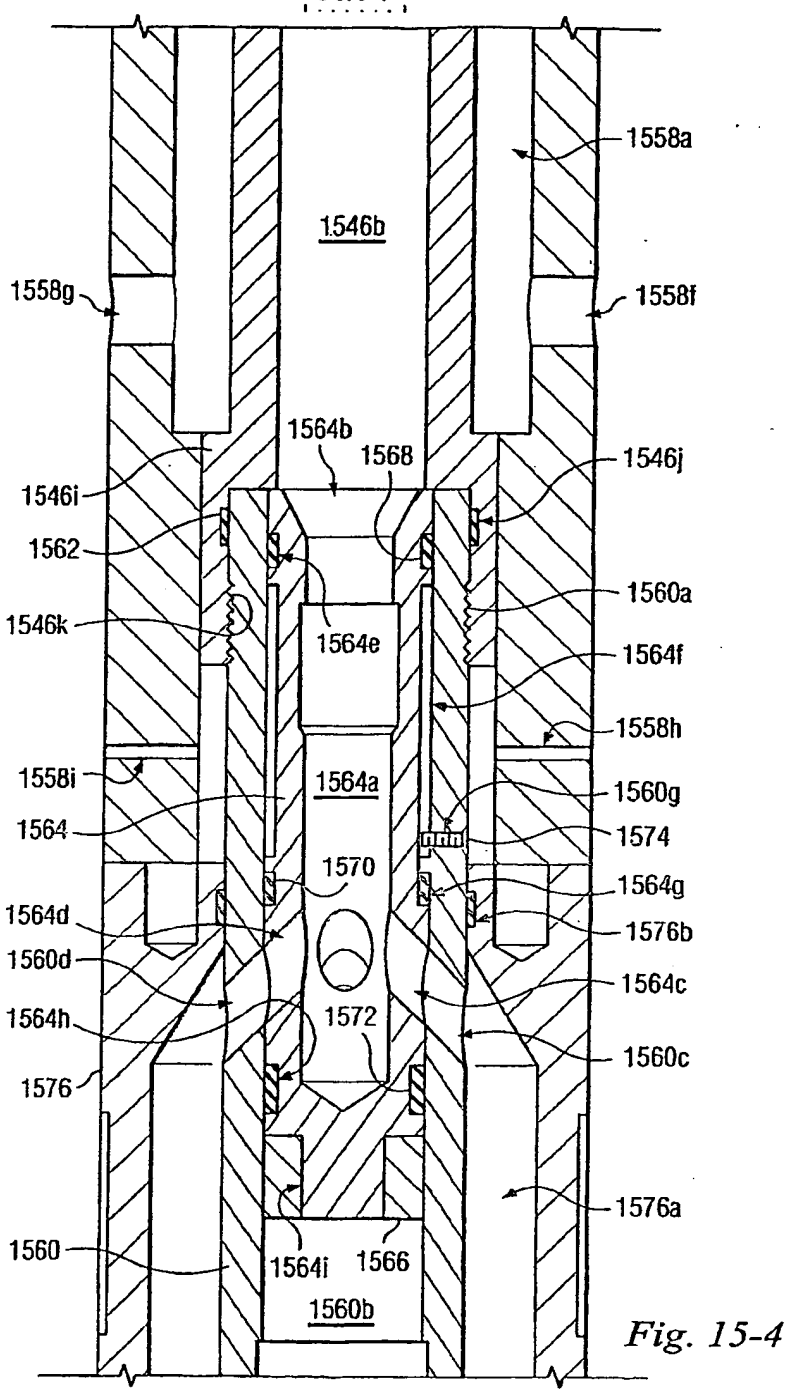

Fig. 15-4

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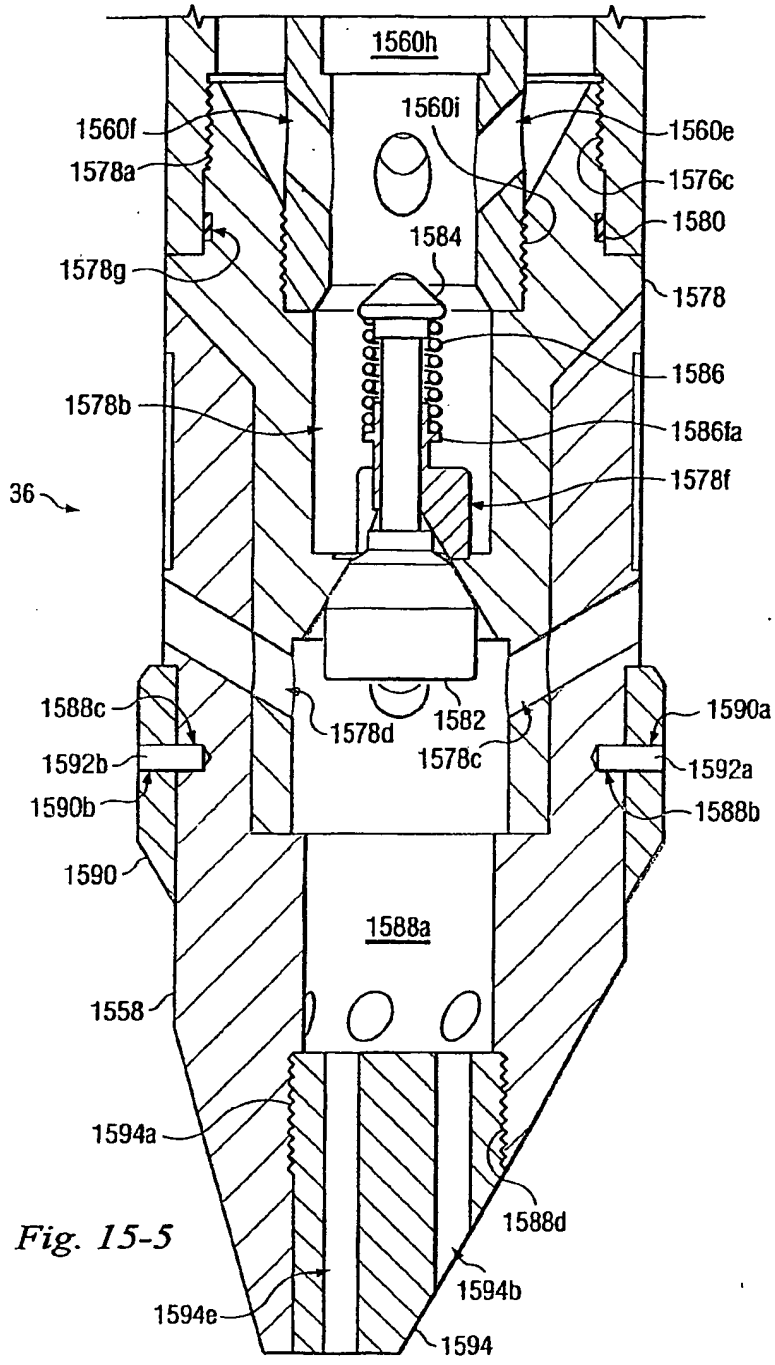


Fig. 15-5

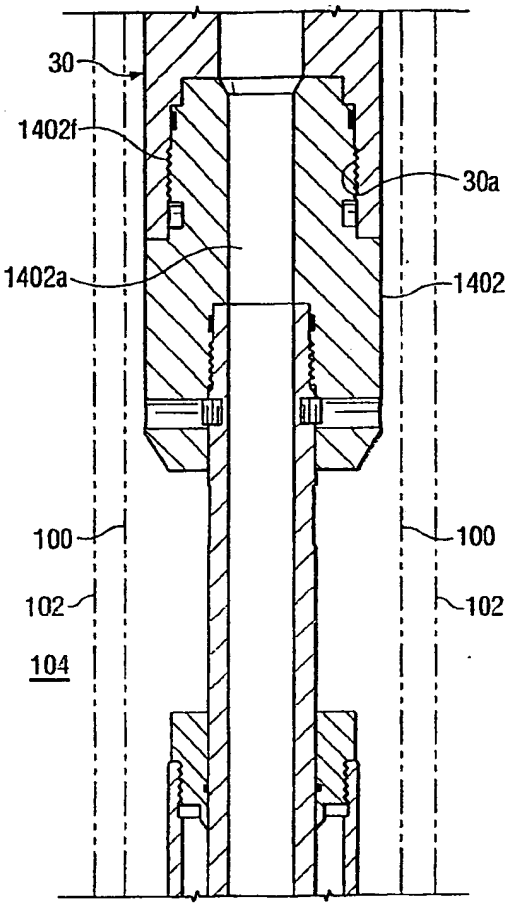


Fig. 16A1

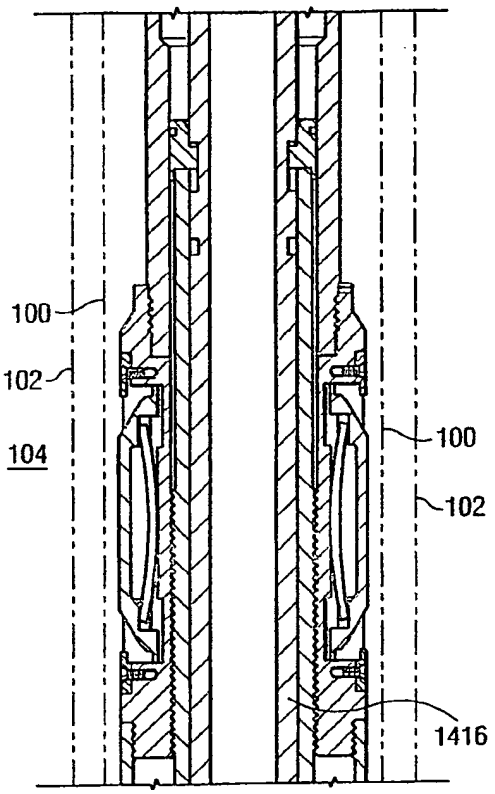
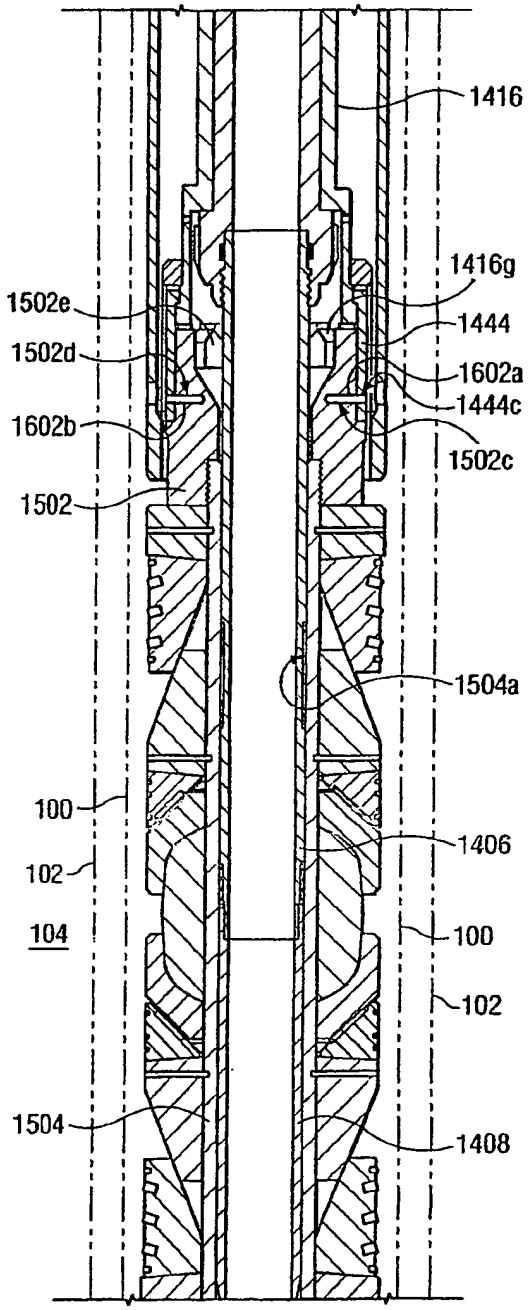


Fig. 16A2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1504a
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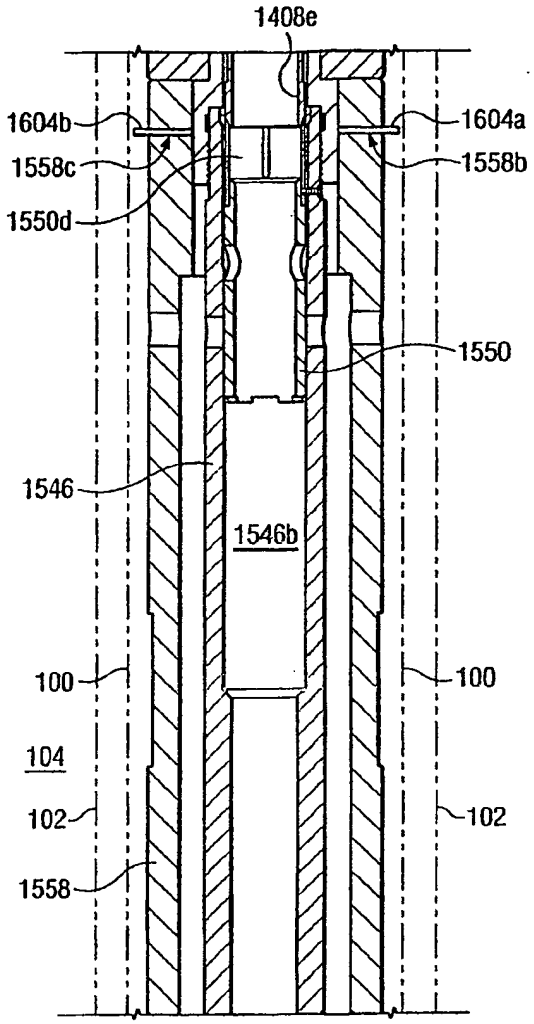
1406
102
104
100
102
1504
1408

Fig. 16A3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1546b
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100
104
102
102
1558

Fig. 16A4

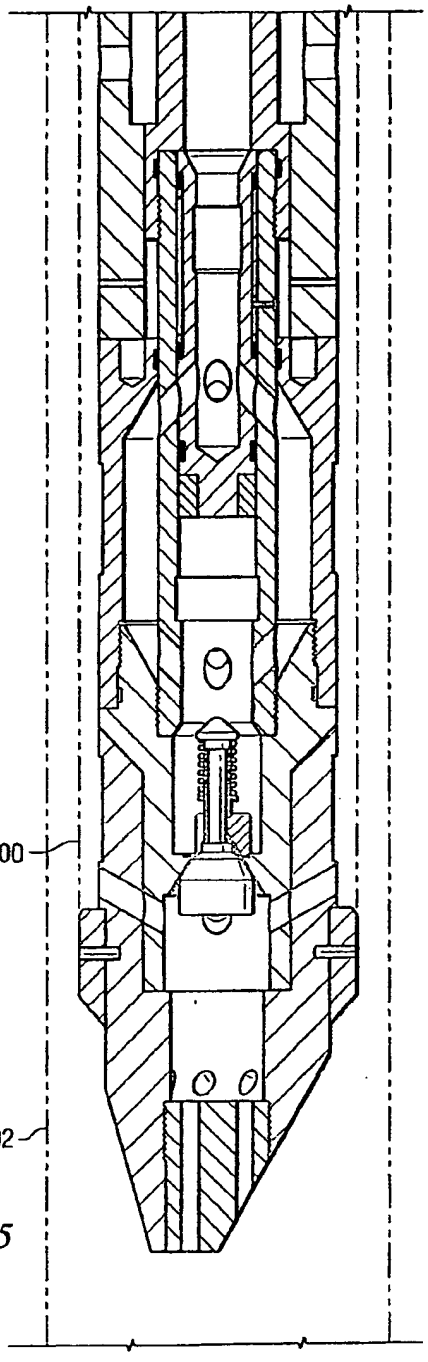


Fig. 16A5

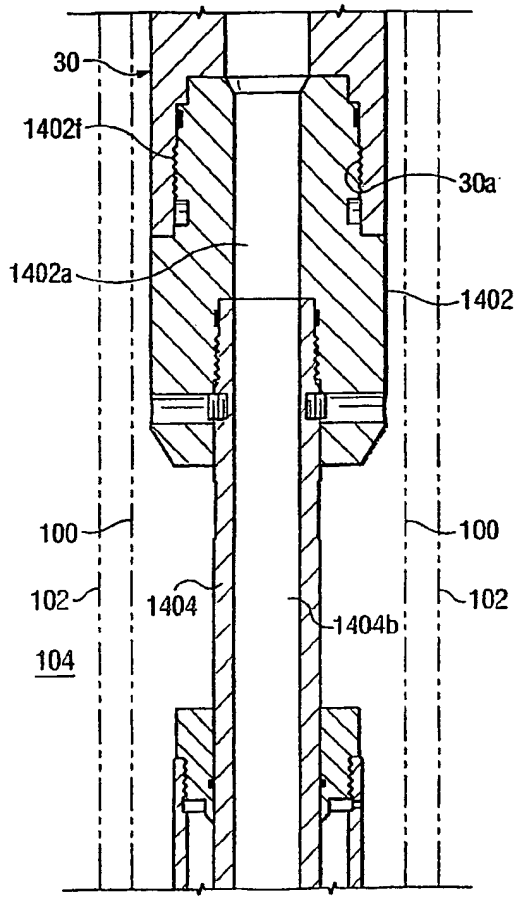


Fig. 16B1

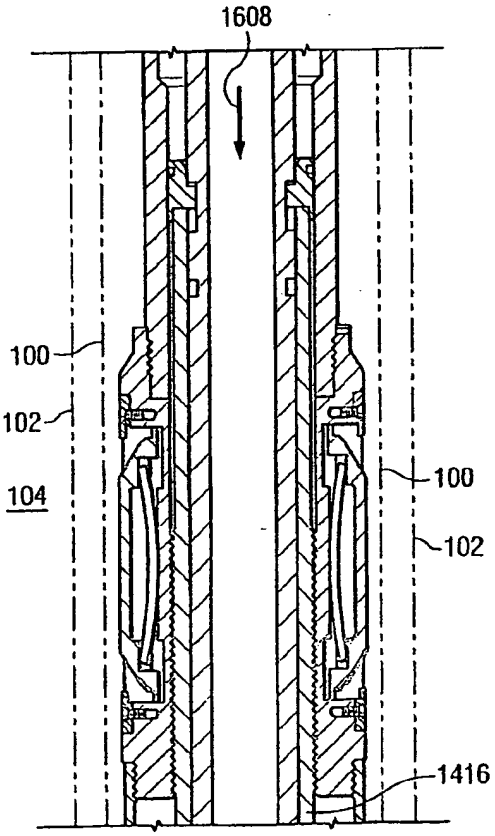
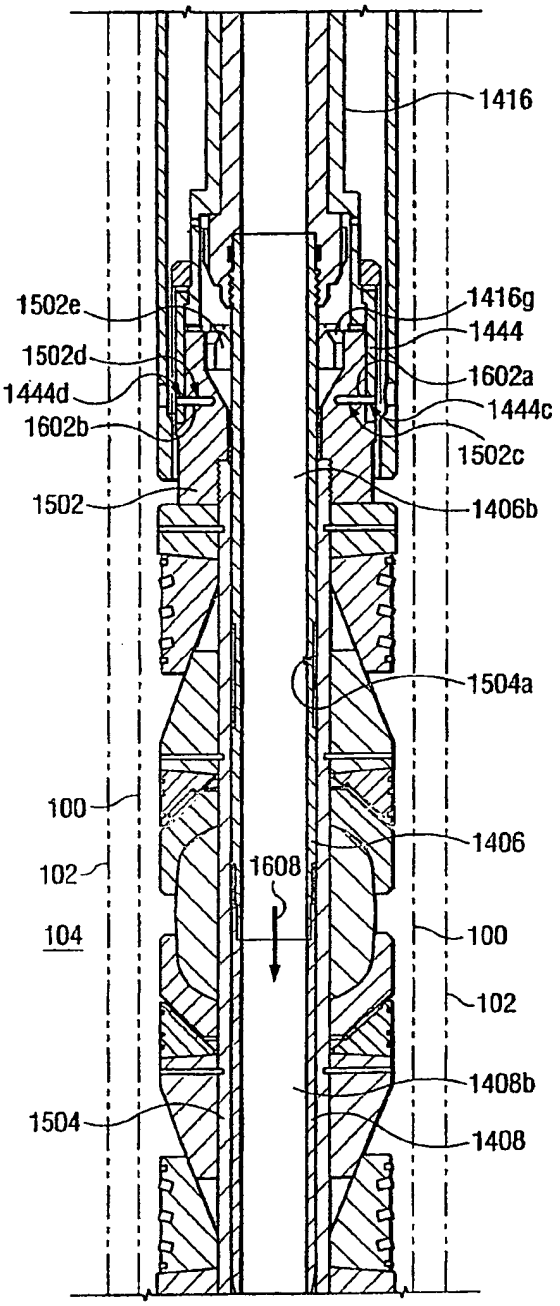


Fig. 16B2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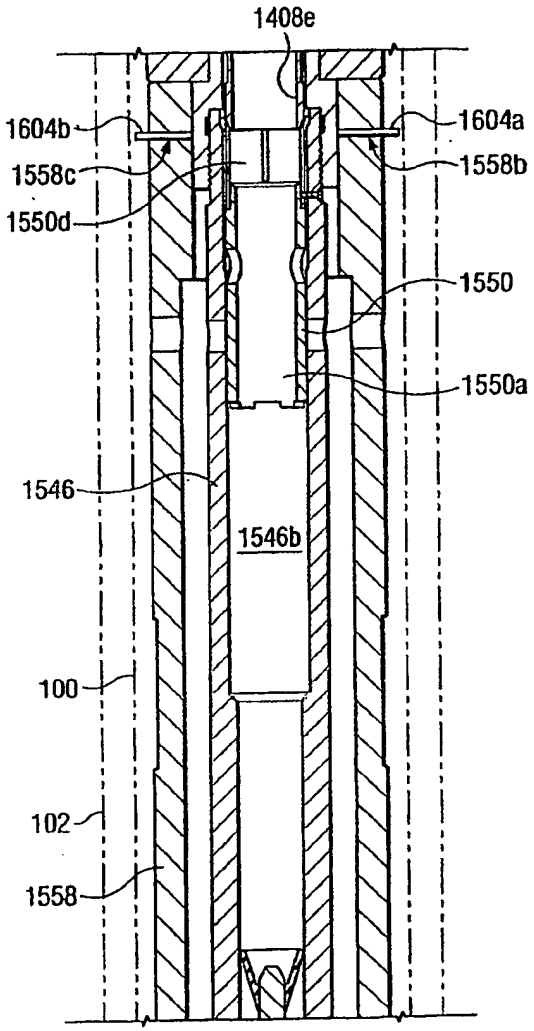
1406
102
1608
104
100
102
1408b
1504
1408

Fig. 16B3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1550a
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1546b
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1558

Fig. 16B4

25791.253

A4

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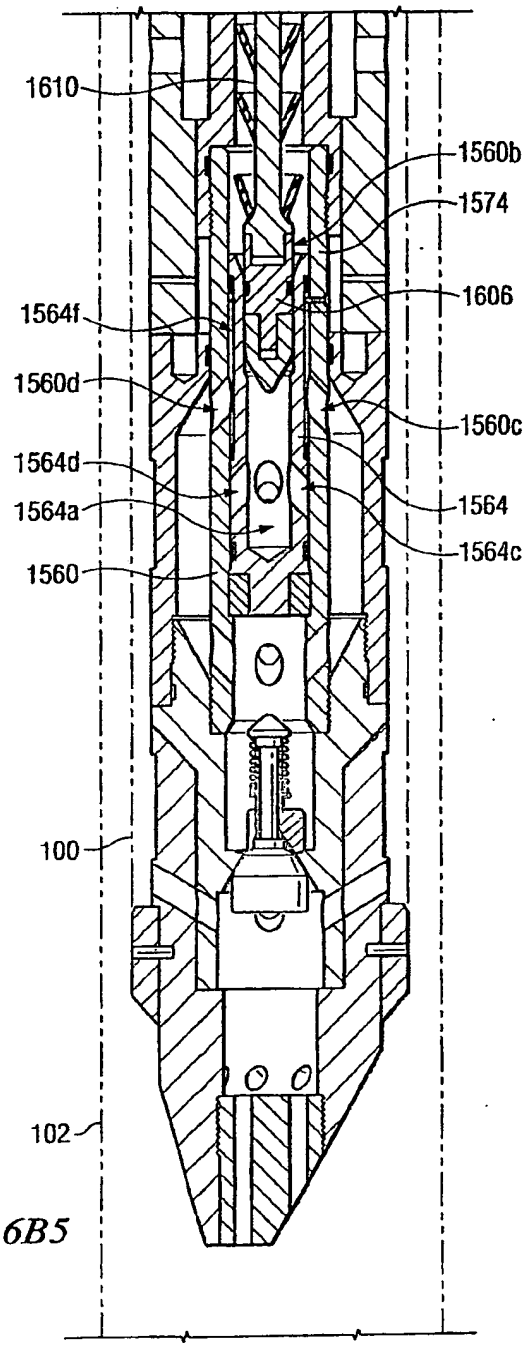

Fig. 16B5

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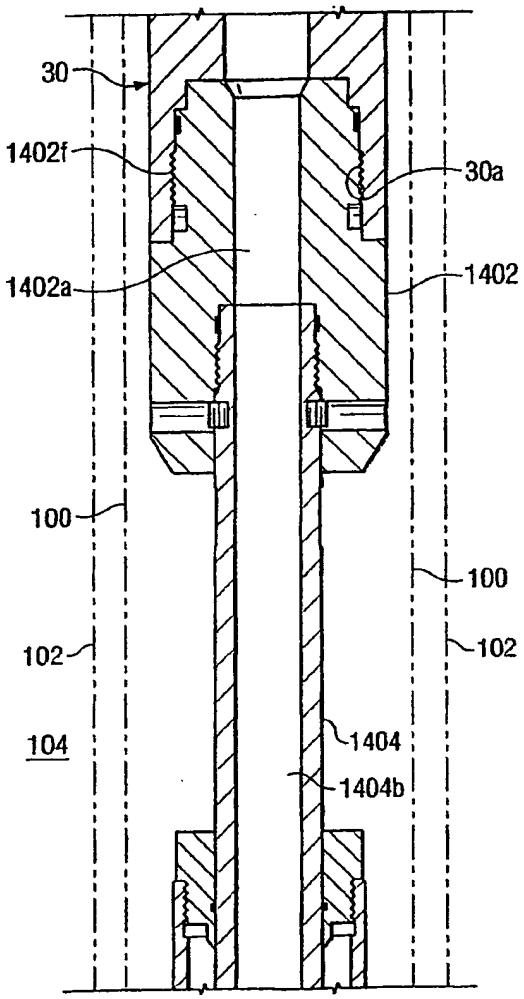


Fig. 16C1

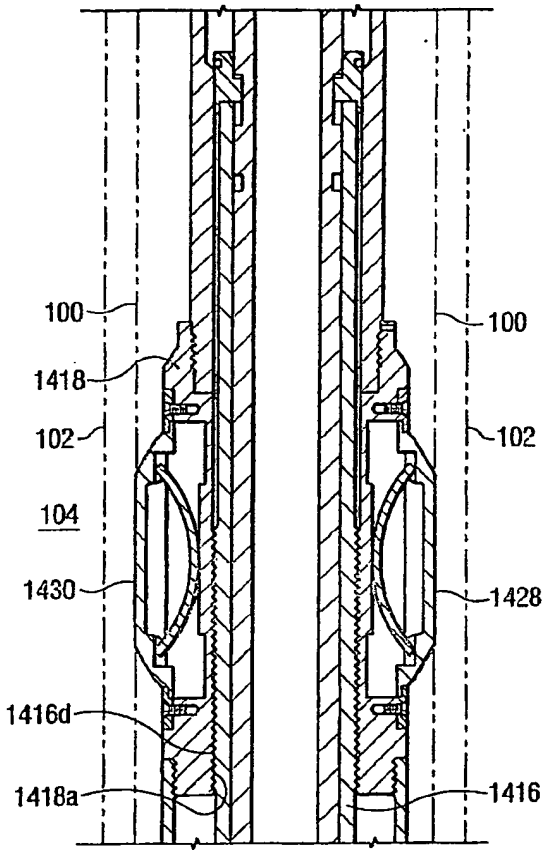
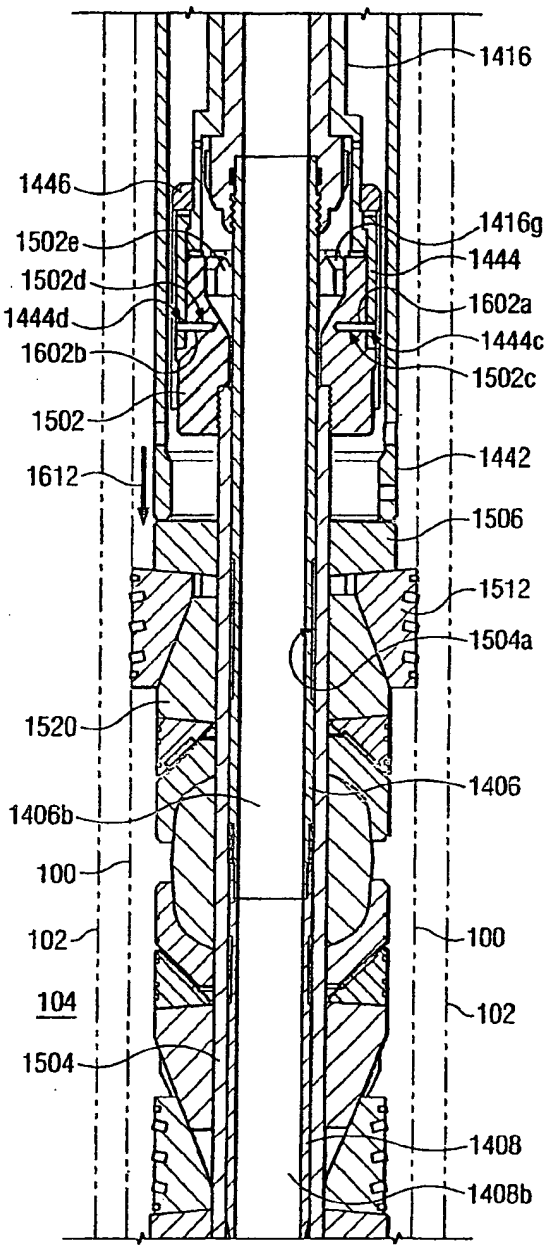


Fig. 16C2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1512
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1406b
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102
100
104
102
1504
1408
1408b

Fig. 16C3

A4

65/94

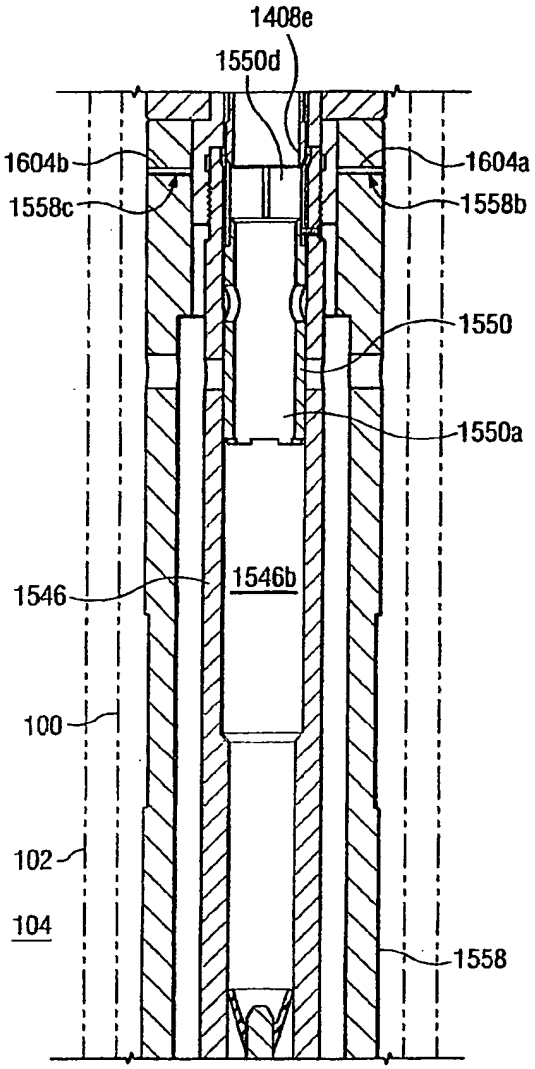
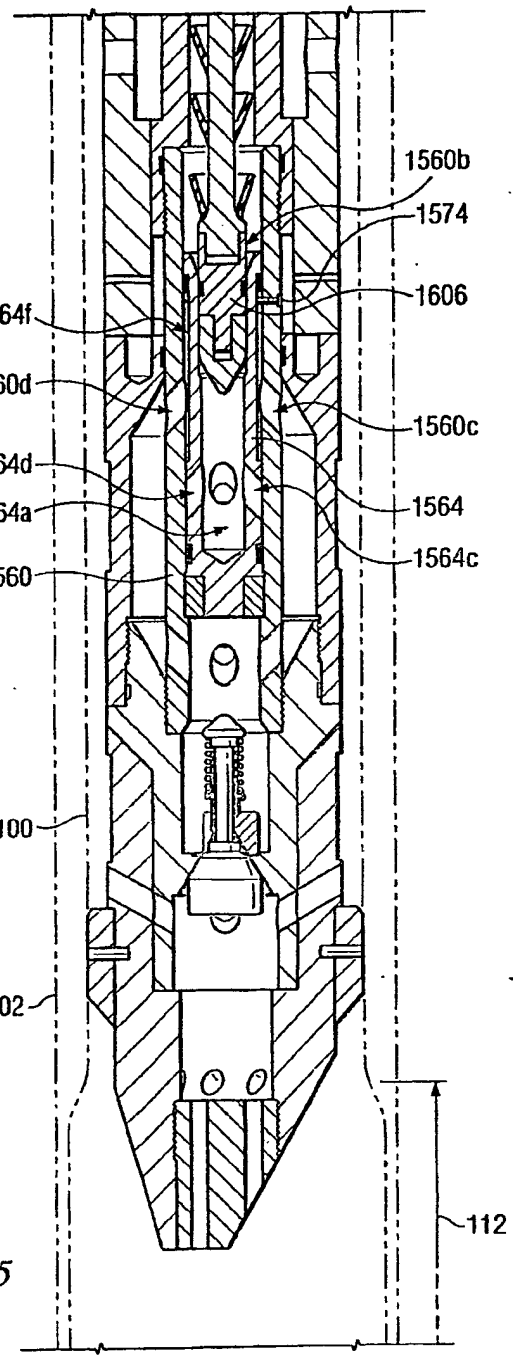


Fig. 16C4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1564c
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102
36
112

Fig. 16C5

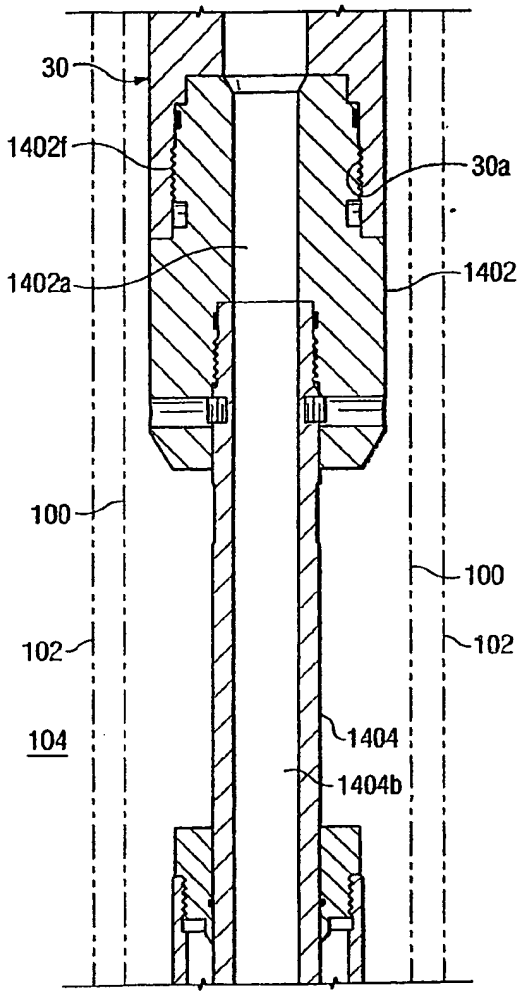

Fig. 16D1

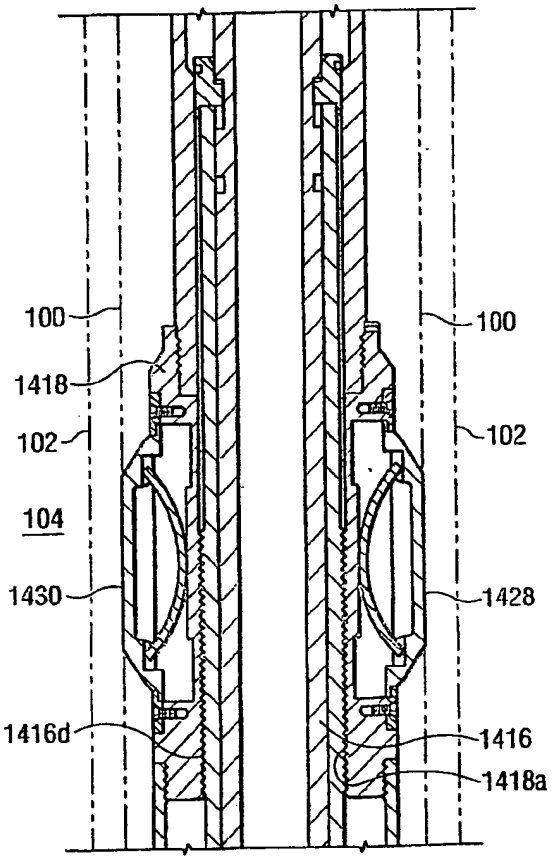

Fig. 16D2

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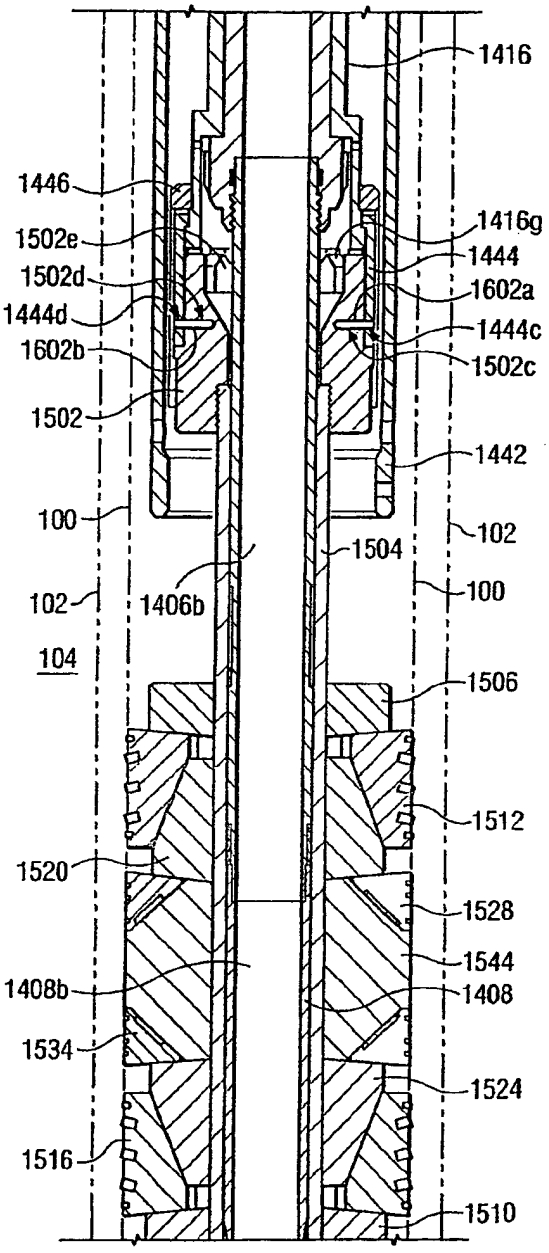
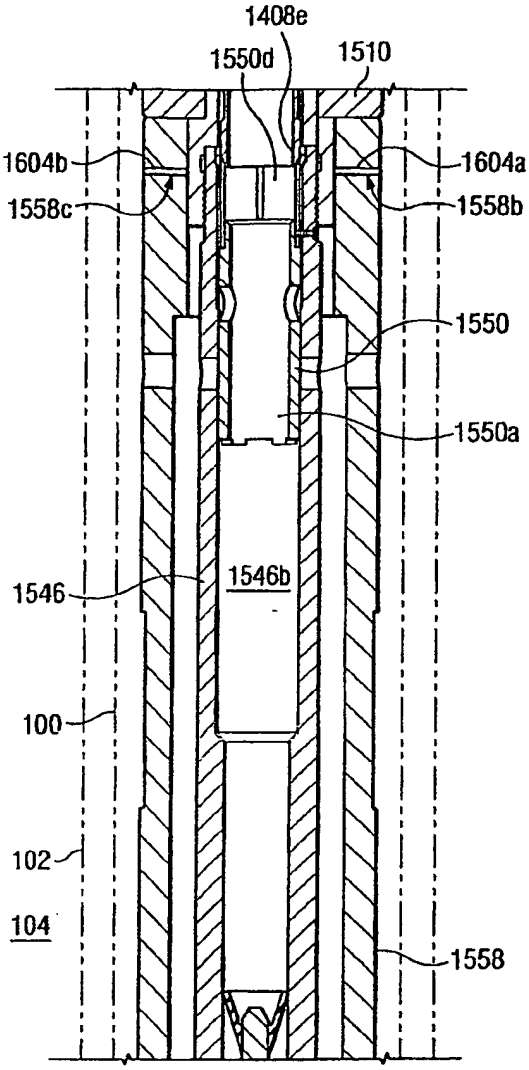


Fig. 16D3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1546b
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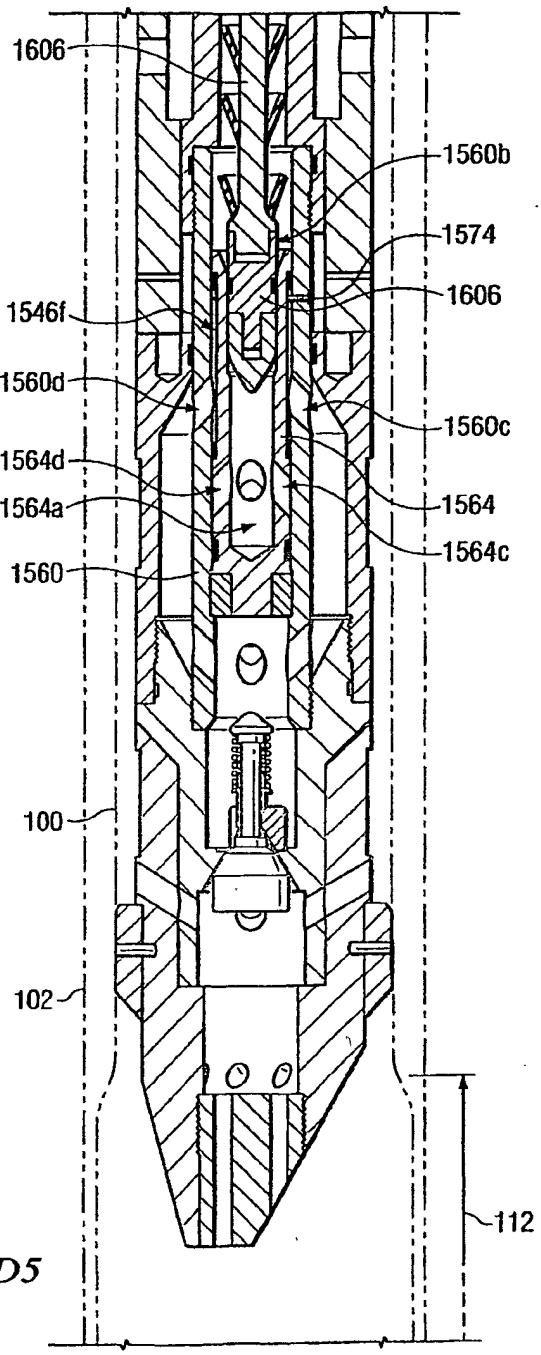
102
104
1558

Fig. 16D4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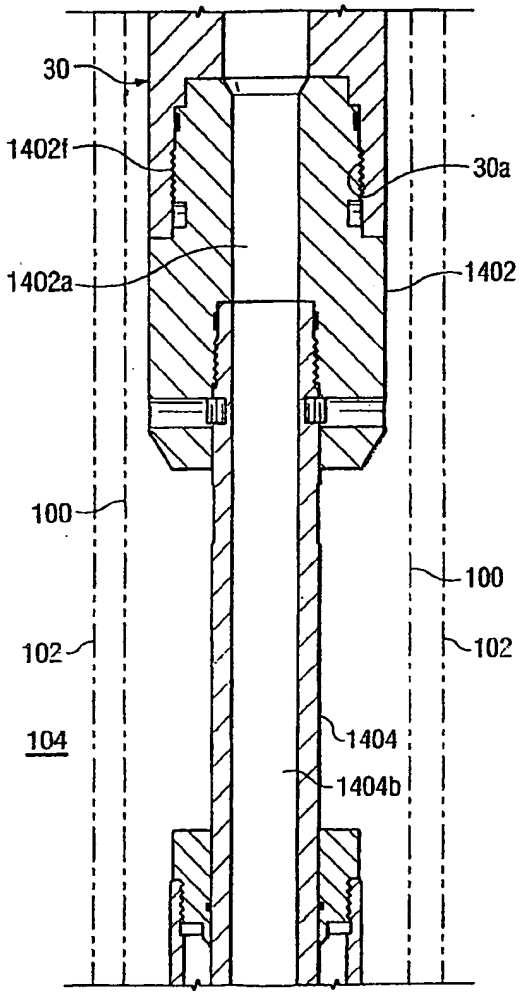
112

Fig. 16D5



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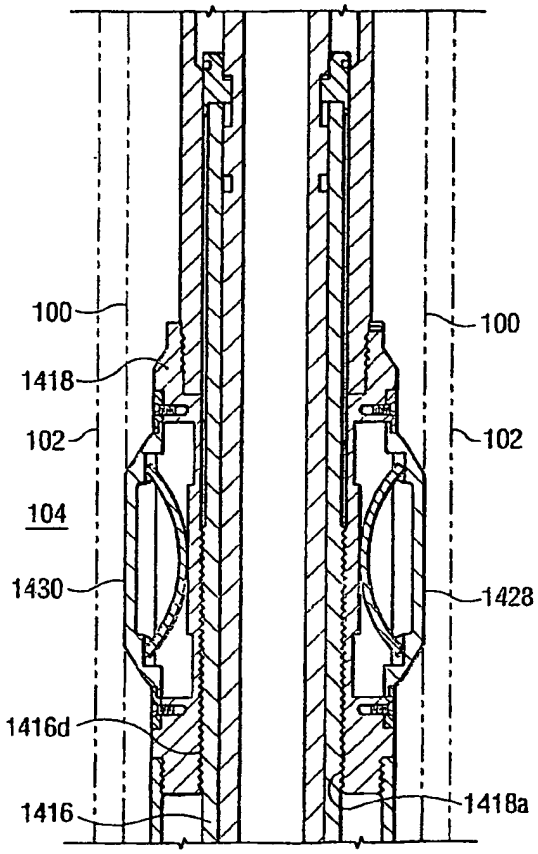
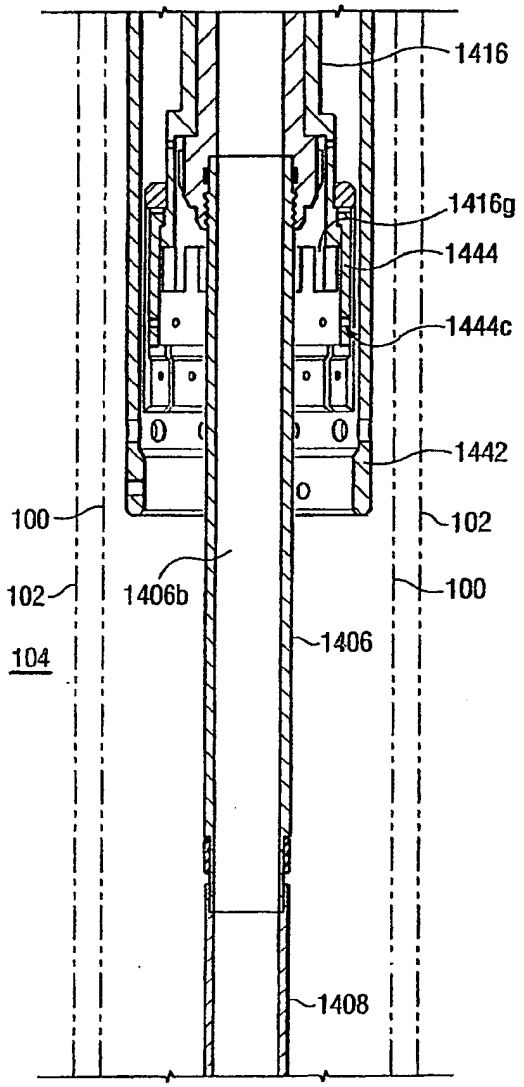


Fig. 16E2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1406
1408

Fig. 16E3

25791.253

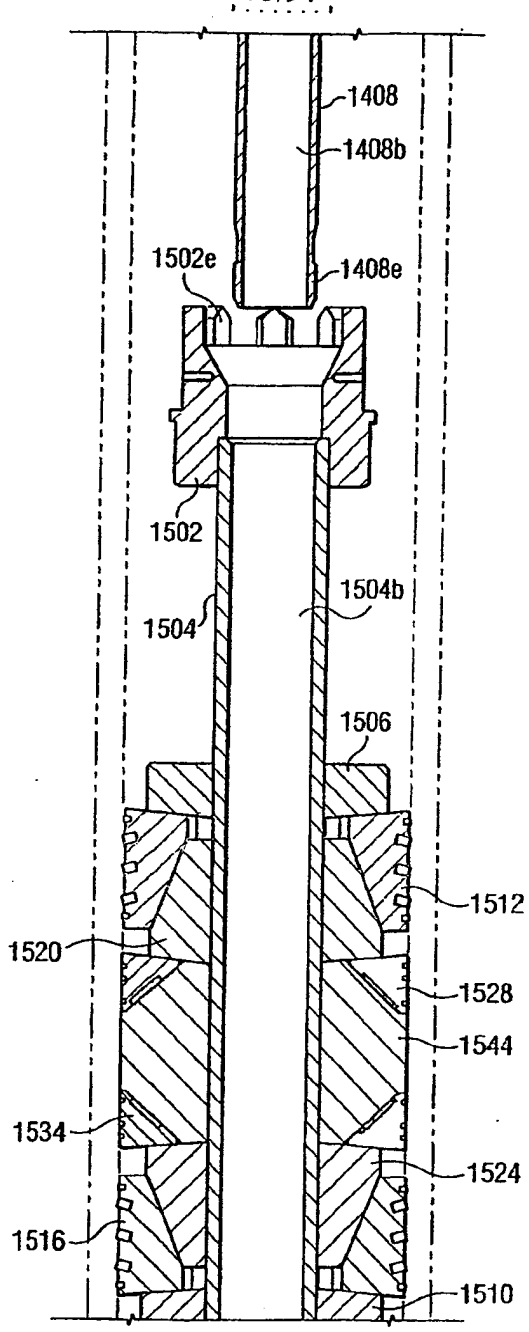


Fig. 16E4

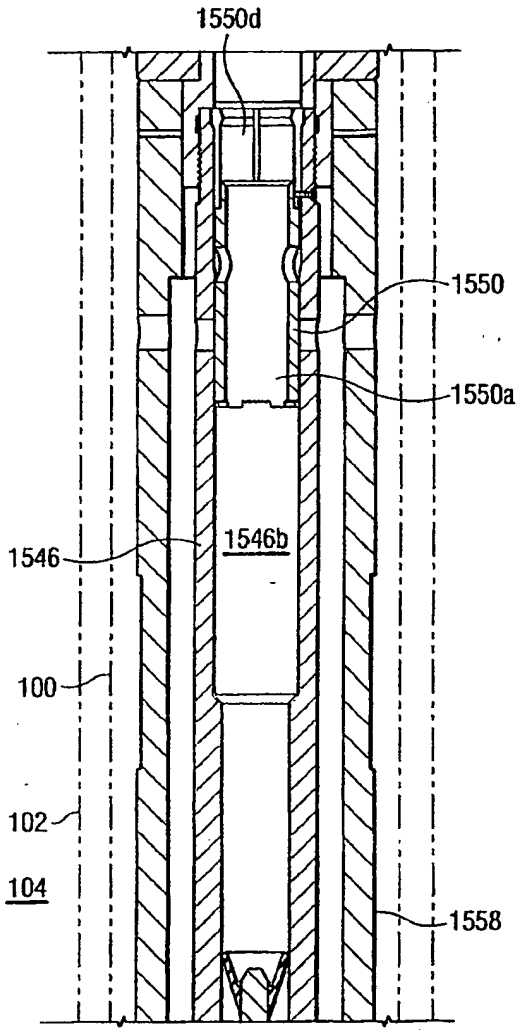
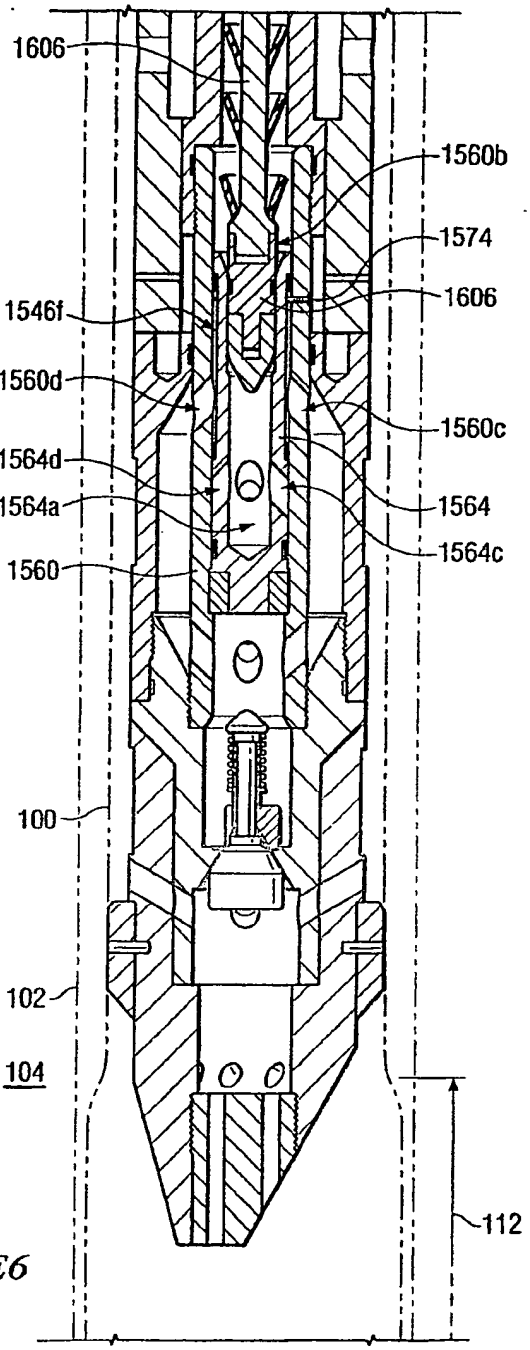


Fig. 16E5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104
112

Fig. 16E6

25791.253

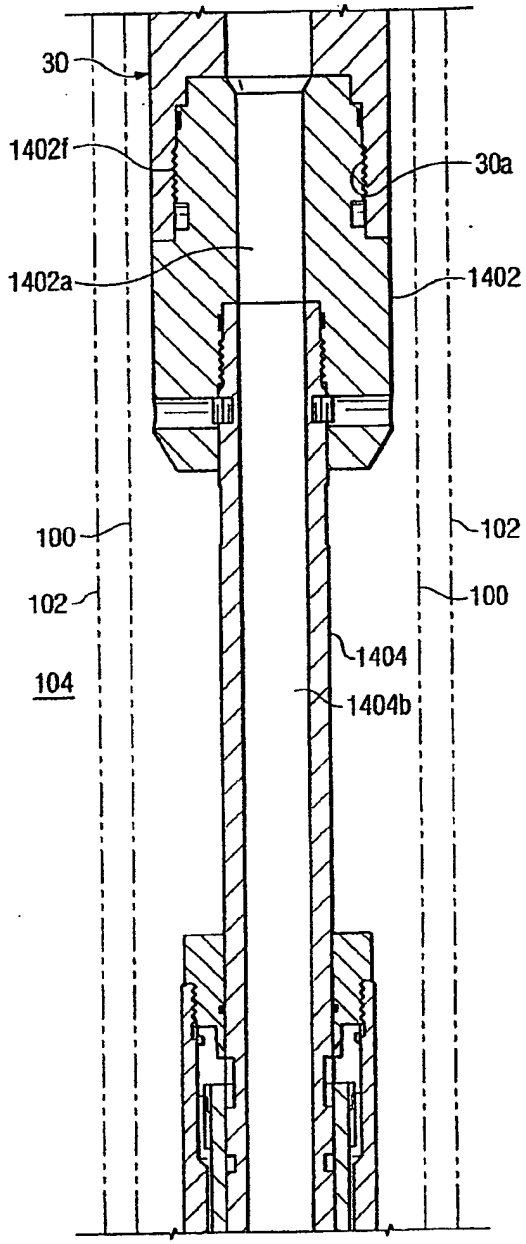
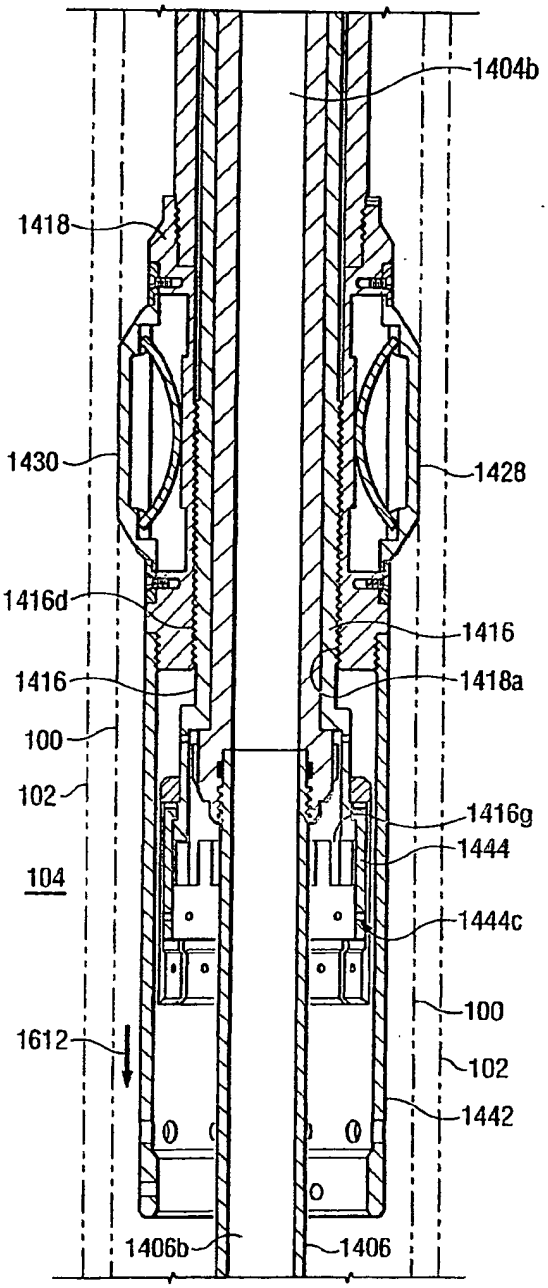


Fig. 16F1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1428
1416d
1416
1416
1418a
100
102
1416g
1444
104
1444c
100
1612
102
1442
1406b
1406

Fig. 16F2

25791.253

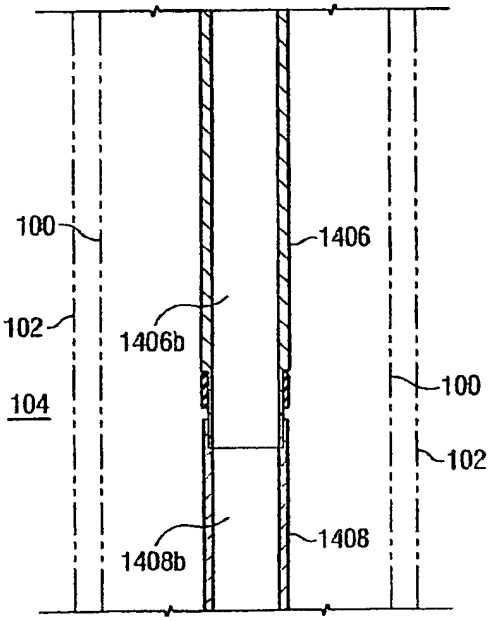

Fig. 16F3

25791.253

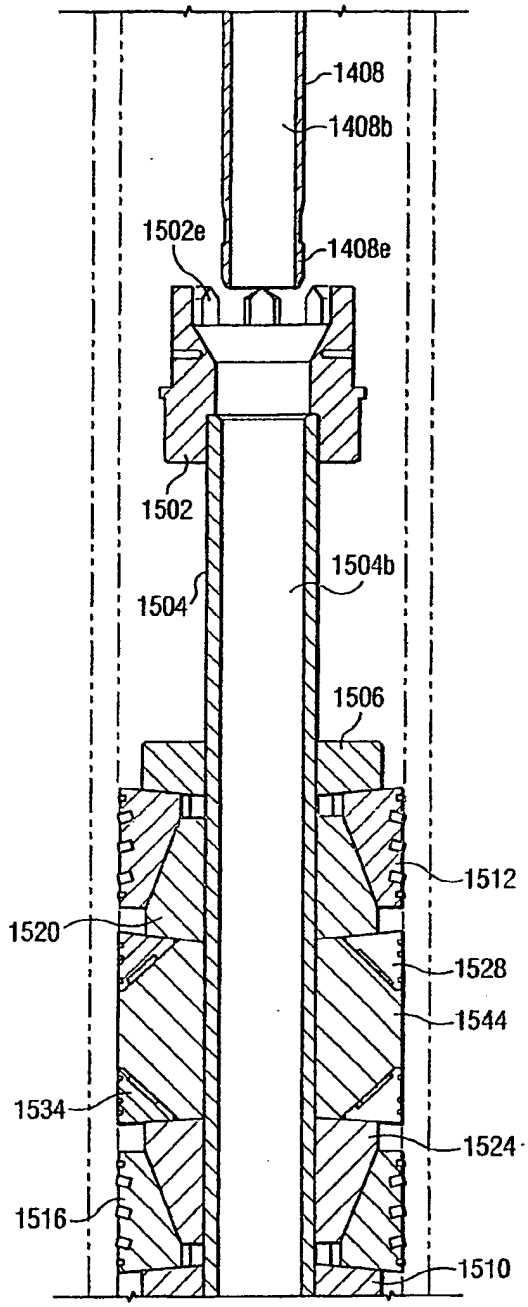

Fig. 16F4

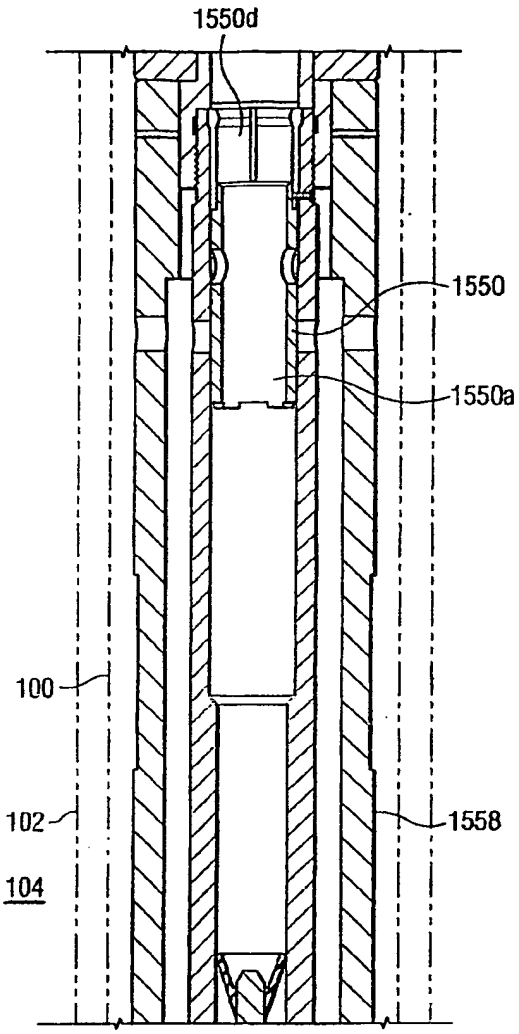

Fig. 16F5

A4

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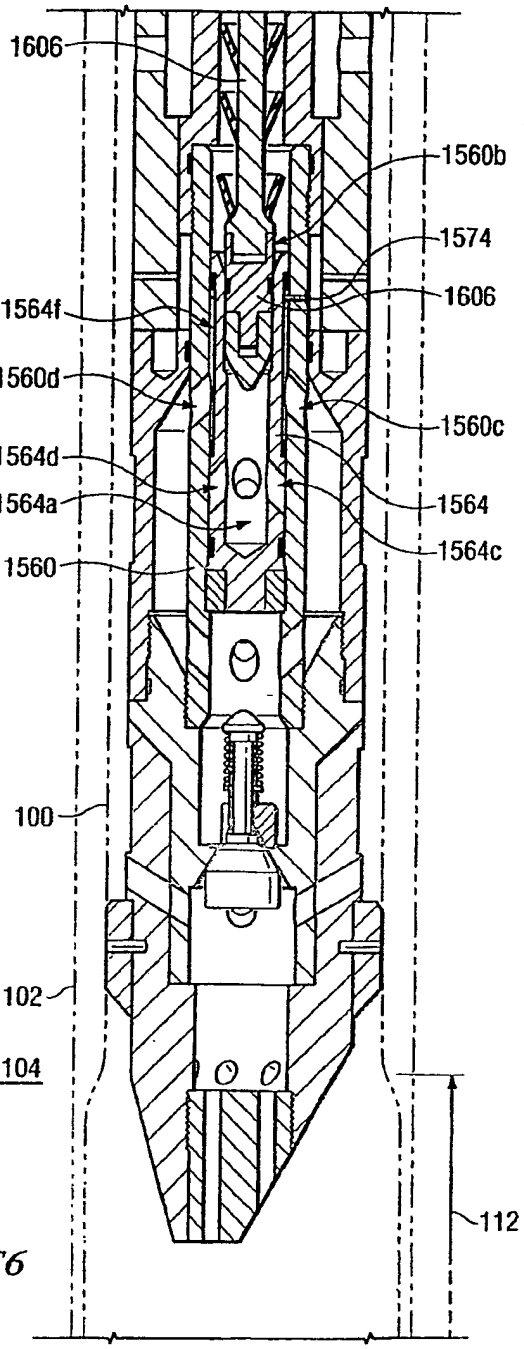


Fig. 16F6

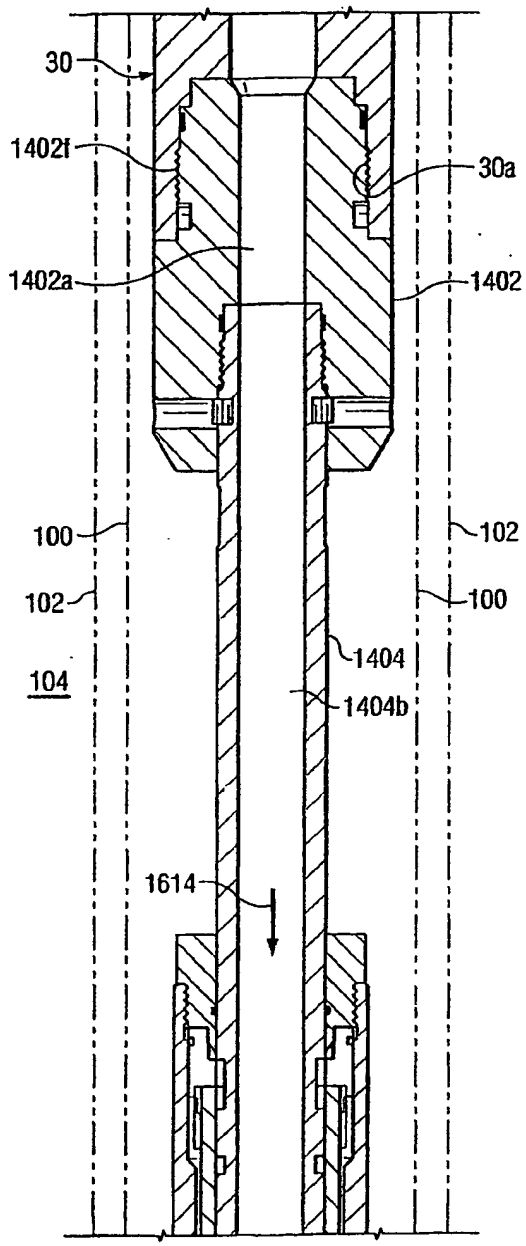
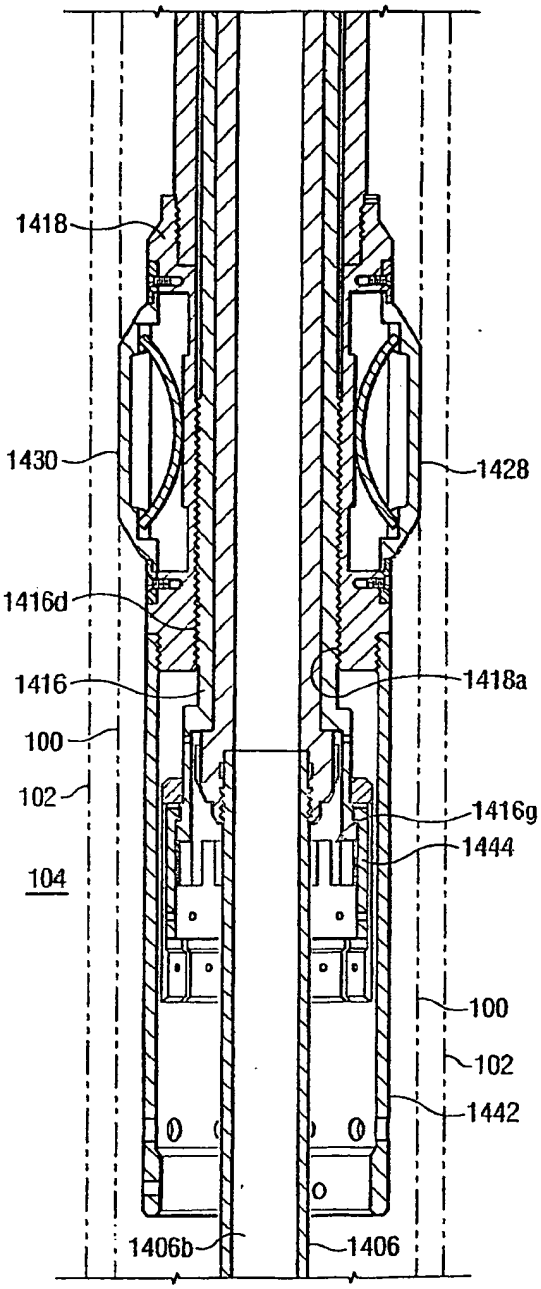


Fig. 16G1


1418
1430
1428
1416d
1416
1418a
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102
104
1416g
1444
100
102
1442
1406b
1406

Fig. 16G2

25791.253

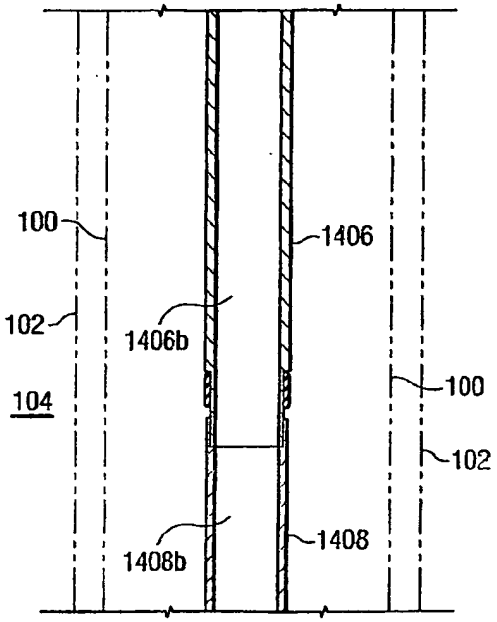

Fig. 16G3

25791.253

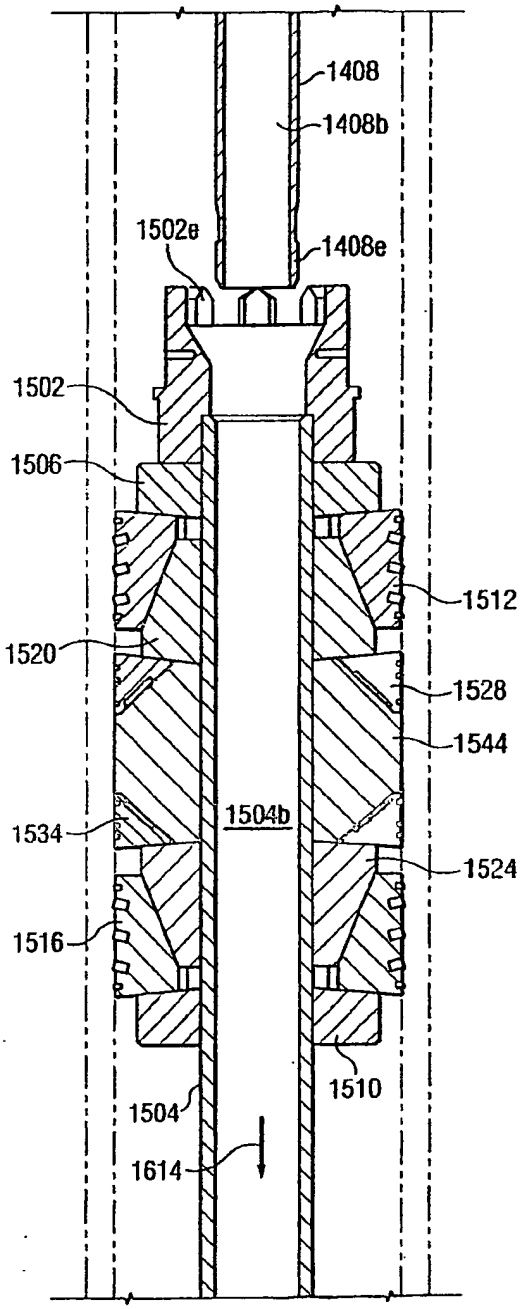

Fig. 16G4

25791.253

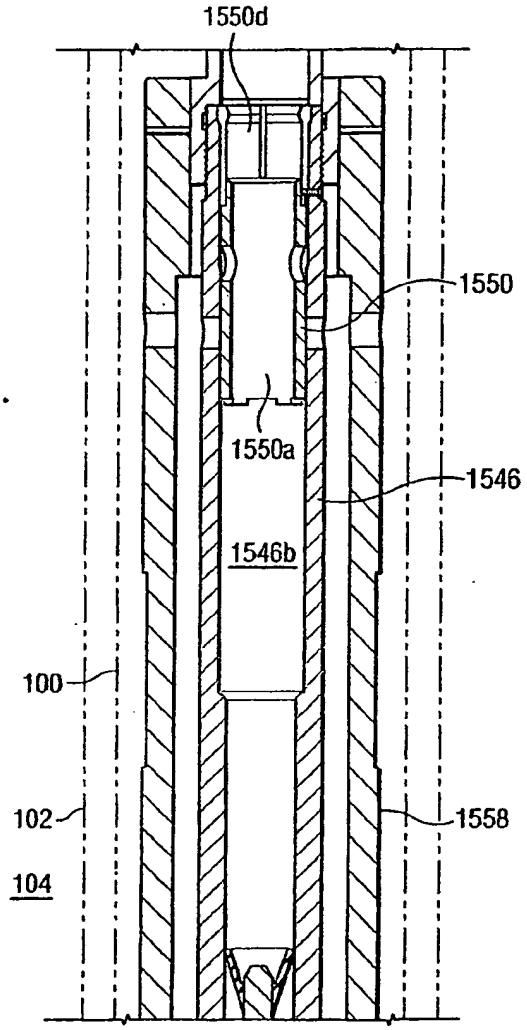

Fig. 16G5

25791.253

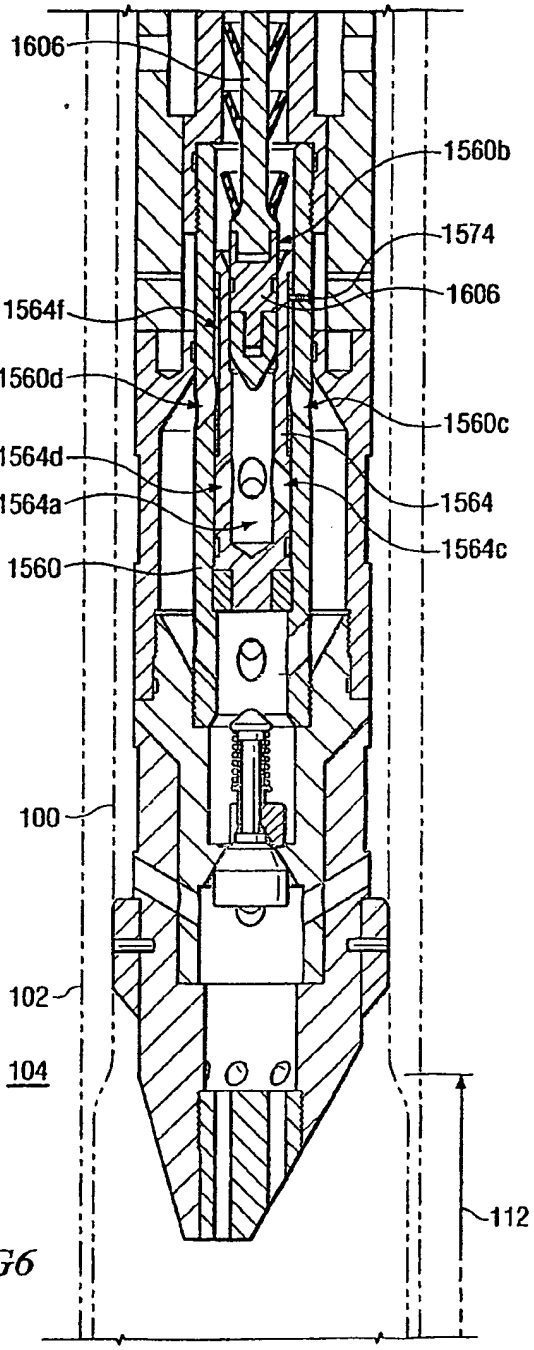

Fig. 16G6

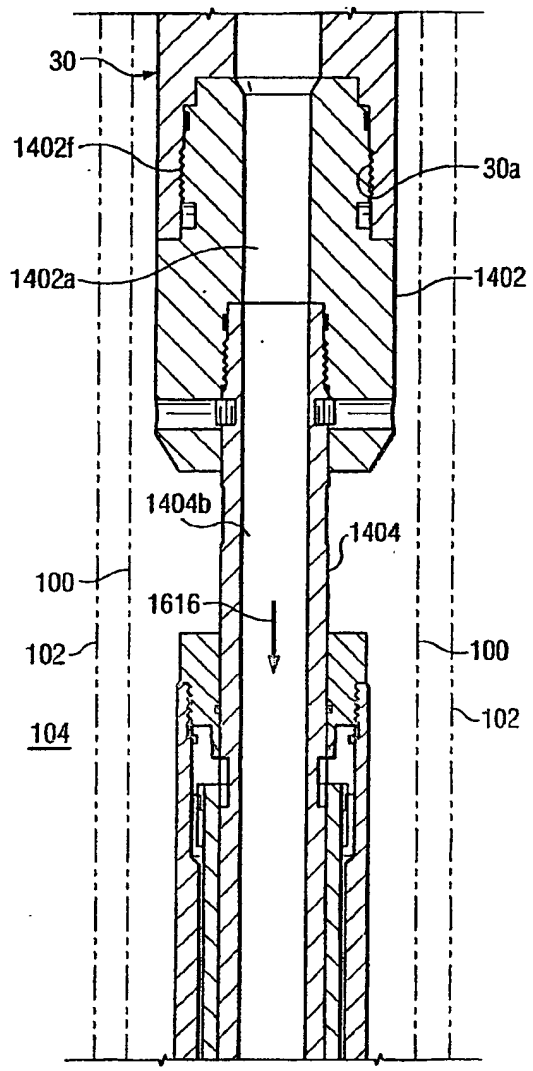

Fig. 16H1

25791.253

A4

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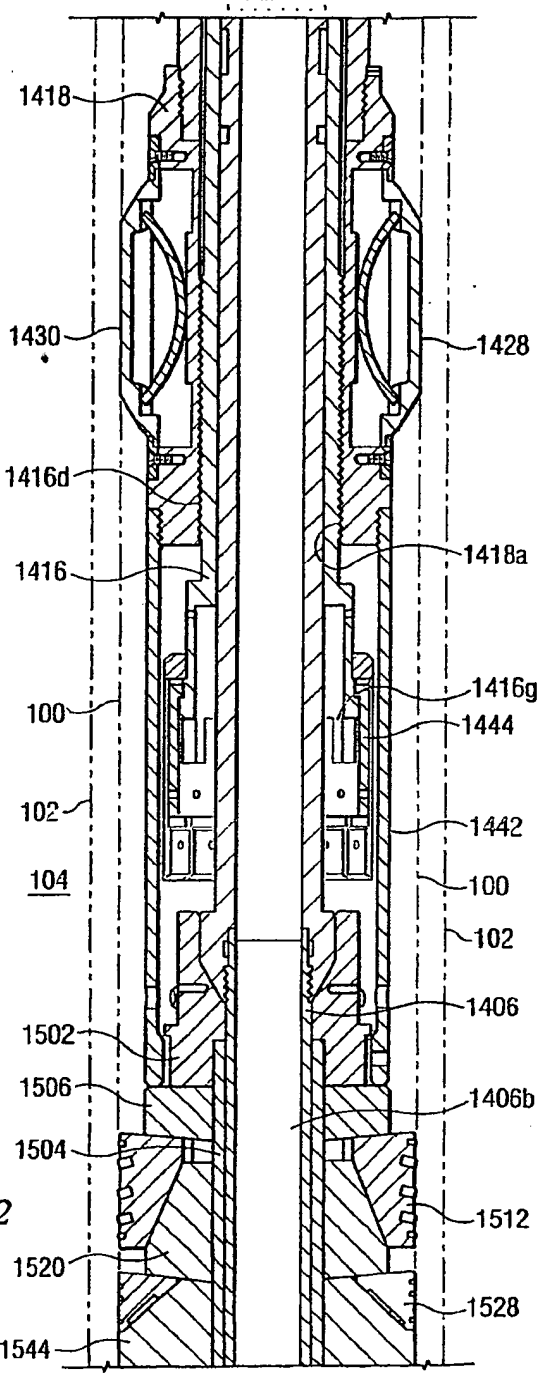


Fig. 16H2

25791.253

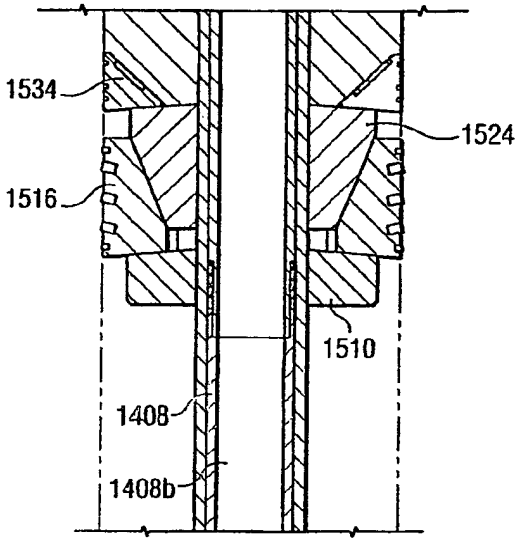
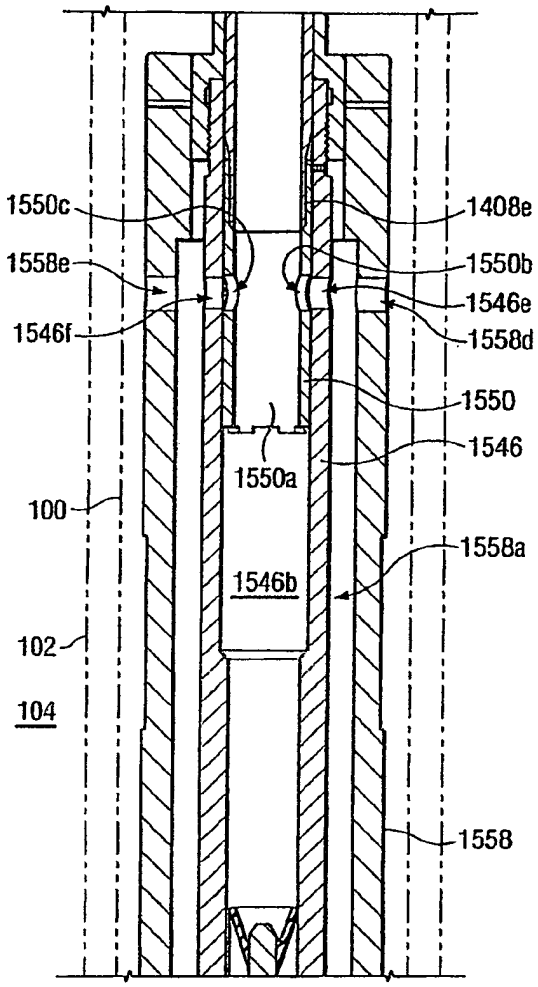


Fig. 16H3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1558e
1550b
1546e
1546f
1558d
1550
1546
1550a
100
1558a
1546b
102
104
1558

Fig. 16H4

25791.253

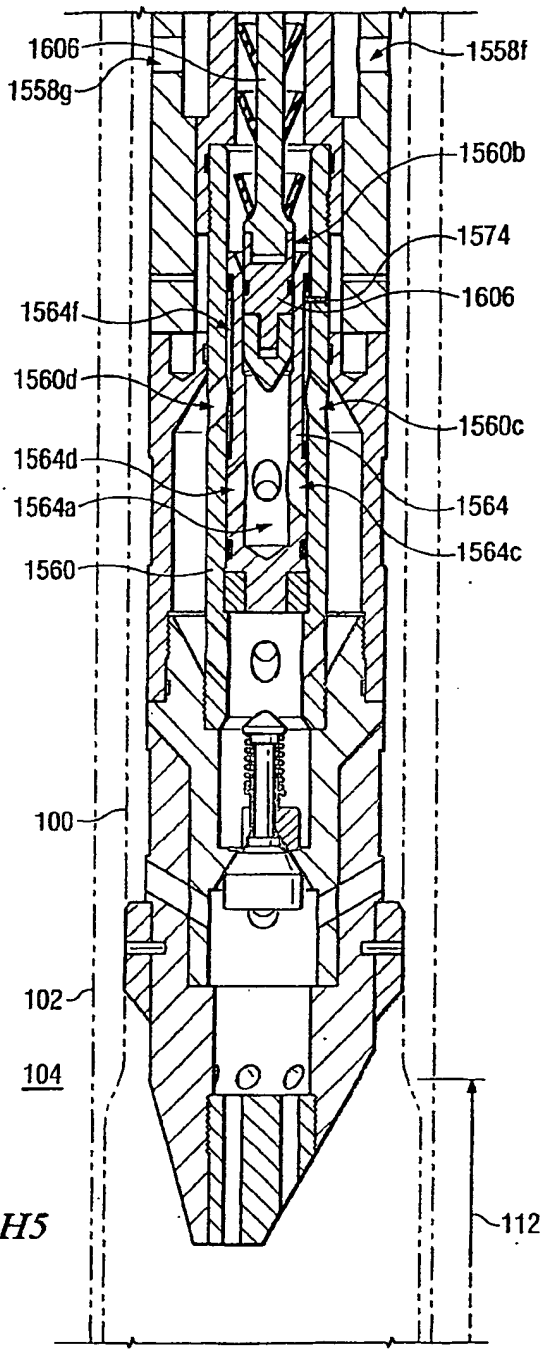

Fig. 16H5